IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

DOCKET NUMBER	ANTICIPATED CLASSIFICATION OF THIS APPLICATION:		PRIOR APPLICATION	
	CLASS	SUBCLASS	EXAMINER	ART UNIT
10873.108USD3				

DIVISIONAL APPLICATION UNDER 37 C.F.R. § 1.53(b)

BOX PATENT APPLICATION
Assistant Commissioner for Patents
Washington, DC 20231

Dear Sir:

    This is a request for filing a divisional application under 37 CFR § 1.53(b) of Serial No. 08/719,796, filed on September 25, 1996 entitled DIGITAL COPIER WITH IMAGE SCANNER APPARATUS AND OFFLINE IMAGE DATA AND CONTROL DATA INTERFACE by the following inventor(s):

Full Name Of Inventor	Family Name Murata	First Given Name Kazuyuki	Second Given Name
Residence & Citizenship	City Kyoto	State or Foreign Country Japan	Country of Citizenship Japan
Post Office Address	Post Office Address 2-15-10, Kasumizaka, Tanabe-cho, Tsuzuki-gun	City Kyoto	State & Zip Code/Country 610-03 / Japan

    ☒   Enclosed is a copy of the prior application; including the specification, claims, drawings, oath or declaration showing the applicant's signature, and any amendments referred to in the oath or declaration filed to complete the prior application. (It is noted that no amendments referred to in the oath or declaration filed to complete the prior application introduced new matter therein.) The continuing application is as follows: 39 pages of specification, 30 claims, 1 pages of abstract, 21 sheets of drawings, and 4 pages of oath or declaration.

    ☒   The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

2.   ☒   Cancel original claims 2-30 of this application before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)

3.   ☒   The filing fee is calculated below:

NUMBER FILED		NUMBER EXTRA		RATE	FEE
TOTAL CLAIMS:					
17	-20	0	x	$18.00	0.00
INDEPENDENT CLAIMS					
6	-3	3	x	$78.00	$234.00
				BASIC FILING FEE:	$690.00
				TOTAL FILING FEE:	$924.00

☐ A Verified Statement that this filing is by a small entity is already filed in the prior application.

☐ A Verified Statement that this filing is by a small entity is attached.

4. ☒ Payment of fees:
    ☒ Attached are checks in the amount of 924.00 and 110.00.
    ☐ Please charge Deposit Account No. 13-2725.

☒ The Commissioner is hereby authorized to charge any additional fees as set forth in 37 CFR §§ 1.16 to 1.18 which may be required by this paper or credit any overpayment to Account No. 13-2725.

6. ☒ Amend the specification by inserting before the first line the sentence:

"This application is a divisional of application Serial No. 08/719,796, filed September 25, 1996, which application(s) are incorporated herein by reference."

7. ☒ A set of formal drawings (21 sheets) is enclosed.

☒ Priority of application Serial No. 7-247638, filed on September 26, 1995 in Japan, and Serial No. 8-005284, filed on January 17, 1996, is claimed under 35 U.S.C. 119.

☒ The certified copy has been filed in prior application Serial No. 08/719,796, filed September 25, 1996.

9. ☒ The prior application is assigned of record to Matsushita Electric Industrial Co., Ltd. located at 1006-banchi, Oaza Kadoma, Kadoma-shi, Osaka 571-8501, Japan.

10. ☒ The Power of Attorney in the prior application is to:

Merchant & Gould P.C.
Minneapolis, MN 55402-4131

11. ☒ A preliminary amendment is enclosed. (Claims added by this amendment have been properly numbered consecutively beginning with the number next following the highest numbered original claim in the prior application.)
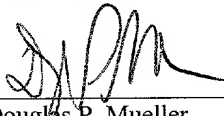
☐ Fee for excess claims is attached.

2

12. ☐ A petition and fee has been filed to extend the term in the prior application until . A copy of the petition for extension of time in the prior application is attached.

13. ☐ The inventor(s) in this application are less than those named in the prior application and it is requested that the following inventors identified above for the prior application be deleted:

14. ☒ Also Enclosed: Information Disclosure Statement; Form 1449; Communication re: Attorney Change of Address

15. ☒ Address all future communications to the **Attention of Douglas P. Mueller** (may only be completed by attorney or agent of record) at the address below.

16. ☒ A return postcard is enclosed.

Respectfully submitted,

MERCHANT & GOULD P.C.
P.O. Box 2903
Minneapolis, MN 55402-0903
612.332.5300

23552
PATENT TRADEMARK OFFICE

Date: July 25, 2000

Douglas P. Mueller
Reg. No. 30,300
DPM/tvm

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Kazuyuki MURATA	Examiner:	Gregory J. Toatley
Serial No.:	Unknown	Group Art Unit:	2838
Filed:	concurrent herewith	Docket No.:	10873.108D3
Title:	DIGITAL COPIER WITH IMAGE SCANNER APPARATUS AND OFFLINE IMAGE DATA AND CONTROL DATA INTERFACE		

PRELIMINARY AMENDMENT AND TERMINAL DISCLAIMER

BOX PATENT APPLICATION
Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Please enter the following Preliminary Amendment prior to taking the present application up for examination.

In the Claims

Please cancel claim 1 without prejudice or disclaimer.

Please add claims 31- 47 as follows:

31. (New)   A printer comprising:

means for printing an image according to image data;

means for retrieving output control data and image data stored in a removable storage medium when the medium is connected to the means for retrieving;

means for setting an operation condition of said printing means according to the output control data; and

means for controlling the printing means according to the operation condition so that the printing means can print an image according to the image data;

wherein data reading from the removable storge medium is enabled and data writing to the medium is disabled when the medium is connected to the printer.

32. (New)   The printer according to claim 31, wherein the removable storage medium is a memory card.

33. (New)   The printer according to claim 31, wherein compressed image data is stored in the removable storage medium and the printer further comprises means for expanding the compressed image data read out from the removable storage medium.

34. (New)   The printer according to claim 31, further comprising means for erasing the image data and output control data stored in the removable storage medium, after printing the image data.

35. (New)   A printer comprising:

means for printing an image according to image data;

means for retrieving output control data and image data from a removable storage medium when the medium is connected to the means for retrieving;

means for setting an operation condition of the printing means according to the output control data;

means for controlling the printing means according to the operation condition so that the printing means can print an image according to the image data;

a sorter for sorting printed paper; and

means for controlling the sorter according to output control data stored in the removable storage medium.

36. (New)   The printer according to claim 35, further comprising means for storing information of functions of the printing means and sorter into the removable storage medium so that the information can be used by an external equipment for generating output control data.

37. (New)   A printer comprising:
    means for printing an image according to image data;
    means for retrieving output control data and image data from a removable storage medium when the medium is connected to the means for retrieving;
    means for setting an operation condition of the printing means according to the output control data;
    means for controlling the printing means according to the operation condition so that the printing means can print an image according to the image data;
    a finisher for stapling printed paper; and
    means for controlling the finisher according to output control data stored in the removable storage medium.

38. (New)   The printer according to claim 37, further comprising means for storing information of functions of the printing means and finisher into the removable storage medium so that the information can be used by an external equipment for generating output control data.

39. (New)   A method for performing operations on a printer, comprising the steps of:
    retrieving output control data and image data stored in a removable storage medium when the medium is connected to the printer;
    setting a printing condition according to the output control data; and
    printing an image on a print medium based on the image data according to the printing condition;
    wherein data reading from the removable storage medium is enabled and data writing to the medium is disabled when the medium is connected to the printer.

40. (New)   The method of claim 39, further comprising a step of storing the image data in the removable storage medium.

41. (New)   The method of claim 40, further comprising a step of erasing the image data stored in the removable storage medium, after printing the image data.

42. (New)   The method of claim 39, further comprising steps of:

storing image data as compressed image data in the removable storge medium; and

reading out the image data from the removable storage medium by expanding the compressed image data.

43. (New)   The method of claim 39, further comprising a step of erasing output control data stored in the removable storage medium, after printing the image data.

44. (New)   A method for performing operations on a printer, comprising the steps of:

retrieving output control data and image data from a removable storage medium when the medium is connected to the printer;

setting a printing condition according to the output control data;

printing an image on a print medium based on the image data according to the printing condition; and

sorting the print medium with a sorter according to the output control data.

45. (New)   The method of claim 44, further comprising a step of storing information of functions of the printer and the sorter into the removable storage medium so that the information can be used by external equipment for generating output control data.

46. (New)   A method for performing operations on a printer, comprising the steps of:

retrieving output control data and image data from a removable storage medium when the medium is connected to the printer;

4

setting a printing condition according to the output control data;

printing an image on a print medium based on the image data according to the printing condition; and

stapling the print medium with a finisher according to the output control data.

47. (New)   The method of claim 46, further comprising a step of storing information of functions of the printer and the finisher into a removable storage medium so that the information can be used by external equipment for generating output control data.

REMARKS

This application is a Continuation of application Serial No. 08/719,796, filed on September 25, 1996. Please amend this application as above. Claims 31-47 are pending.

Claims 31-38 and 39-47 correspond to claims 1-8 and 22-30 of the parent application, respectively, but are directed to a printer rather than a copier. As claims 1-8 and 22-30 were considered allowable in the parent application, it is believed that the present claims 31-47 should be allowable. A Terminal Disclaimer over the parent case is provided below in the interests of advancing prosecution. A check in the amount of $110 is filed herewith for the disclaimer fee. Any additional fees can be charged to Deposit Account 13-2725.

Terminal Disclaimer

Petitioner, Matsushita Electric Industrial Co., Ltd., the owner of the entire right, title and interest in the present application and parent application U.S. Serial No. 08/719,796 filed on September 25, 1996, by virtue of Assignment recorded at Reel 8219, Frame 0912, through the undersigned attorney of record, hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the above-identified application, which would extend beyond the expiration date of the full statutory term of the patent to issue from U.S. Serial No. 08/719,796 filed on September 25, 1996 and hereby agrees that any patent so granted on the above-identified application shall be enforceable only for and during such period that the legal title to said patent shall be the same as the legal title to the patent to issue from U.S. Serial No.

08/719,796 filed on September 25, 1996, this agreement to run with any patent granted on the above-identified application and to be binding upon the grantee, its successors, or assigns.
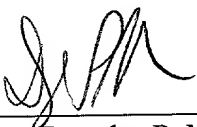
In making the above disclaimer, Petitioner does not disclaim the terminal part of any patent granted on the above-identified application that would extend to the full statutory term as presently shortened by any terminal disclaimer of the patent to issue from U.S. Serial No. 08/719,796 filed on September 25, 1996 in the event that any such issued patent: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321(a), has all claims cancelled by a reexamination certification, or is otherwise terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer, except for the separation of legal title stated above.

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Early and favorable action on this application in the form of a Notice of Allowance is requested. The Examiner is invited to telephone the undersigned at (612) 371-5237 in order to expedite prosecution.

Respectfully submitted,

MERCHANT & GOULD P.C.
P. O. Box 2903
Minneapolis, MN 55402-0903
612/332-5300

Date: July 25, 2000

By _____
Douglas P. Mueller
Reg. No. 30,300
DPM/VW

6

DIGITAL COPYING MACHINES AND IMAGE READERS WITH OFFLINE INTERFACE

BACKGROUND OF THE INVENTION

The present invention relates to a digital copying machine and an image reader provided with the functions of offline image input and output using a removable storage medium.

Recently, the demand for high speed and multi-functional digital copying machines has arisen, and a digital copying machine provided with a facsimile function, a printer function, etc. in addition to a copy function has been developed. A conventional digital copying machine will be described below, referring to the figures. Fig. 13 is a block diagram which shows a flow chart for an image signal of a conventional digital copying machine.

As shown in Fig. 13, an image sensor 71 scans an original to convert reflected light from the original to an electric signal. An analog image signal from image sensor 71 is then converted to a digital image signal by an analog-to-digital (A/D) converter 72. The converted digital image signal is subjected to image processing such as edge enhancement, trimming, and halftone processing, and edit processing in an image processor 73. An image signal given by image processor 73 is buffered in a buffer memory 74 for speed control to be given to a laser driver 78. Laser driver 78 drives a semiconductor laser 79 to form an electrostatic latent image by laser beams given by semiconductor laser 79.

The digital copying machine further comprises a central processing unit (CPU) 85, a local area network (LAN) controller 80, a page memory 84, a parallel interface (I/F) 81, a communication

control unit (CCU) 82, and a compressor/expander 86 which are mutually connected by a CPU bus 83.

CPU 85 comprises a random access memory (RAM) and a read only memory (ROM) and controls the entire digital copying machine. Page memory 84 has capacity that can store at least one page of image data and is connected to buffer memory 74. Image data stored in page memory 84 is given to laser driver 78 through buffer memory 74 to be printed on paper.

LAN controller 80 communicates with an external equipment through a local area network (LAN). When the digital copying machine is used as a remote printer, an external equipment such as a computer transmits a print control command and image data to the digital copying machine through the LAN. CPU 85 stores the image data received through the LAN into the page memory according to the received print control command.

Using parallel I/F 81, the digital copying machine and an external equipment can be connected one to one. When the digital copying machine is used as a printer for the external equipment, the external equipment transmits a print control command and image data to the digital copying machine through the parallel I/F of the digital copying machine. When the image scanner function of the digital copying machine is used by the external equipment, the external equipment transmits an image read control command to the digital copying machine through parallel I/F 81, and read image data is transmitted to the external equipment from the digital copying machine.

CCU 82 communicates with an external facsimile through a

2

public network using a modem 87. Image data received by the facsimile is expanded in compressor/expander 86, transferred to page memory 84, and printed. Also, image data read for facsimile transmission is stored in page memory 84, compressed in compressor/expander 86, and transmitted to the external facsimile through CCU 82 and modem 87.

Generally, a high-speed digital plain paper copier (PPC) which is capable of copying more than tens of sheets per minute is located in a common space such as a copy room or a hallway. When copying a document which is prepared by a personal computer, etc. in plural copies, a user has to print the original by a nearby printer, take the original to a place where a digital copying machine is located, and then copy the original in plural copies using a sorter, etc. of the digital copying machine. Especially, when a personal computer used by a user is not connected through a LAN, the remote print function of the digital copying machine can not be used, so that copying must be done as mentioned above. In this case, an original image is once printed on paper before copying it, and therefore the image is inevitably degraded.

When a personal computer used by a user is connected to the digital copying machine through a LAN, the user can use the remote print function of the digital copying machine. Therefore, the user can directly utilize a function such as a sorter of the digital copying machine from his personal computer. However, when copying by using the remote print function of the digital copying machine, the user has to go to a distant place where the digital copying machine is located to take printed paper. Also, when copying in

3

large amount using the remote print function, problems such as using up paper and paper jam are likely to occur. To solve these troubles, the user also has to go to the place where the digital copying machine is located. Thus, the utility value of the remote (online) print function in a high-speed digital copying machine is not very high.

When using the image scanner function of the digital copying machine from a user's personal computer online by using the parallel I/F and the LAN, similar problems arise. That is, the user has to go to a distant place where the digital copying machine is located to set an original in the image scanner part of the digital copying machine. Therefore, when the digital copying machine and the user's computer are located a distance apart, it is not useful to use the image scanner function of the digital copying machine online.

Next, a conventional image reader will be described. Fig. 21 is a block diagram showing a flow chart for an image signal of a conventional image reader. An image sensor 171 scans an original to convert reflected light from the original to an electric signal. An analog image signal given by image sensor 171 is converted to a digital image signal by an A/D converter 172, and given to an image processor 173. Image processor 173 performs image processing such as edge enhancement, trimming, halftone processing, pixel density conversion, and gradation level conversion as well as edit processing on the digital image signal. Image data given by image processor 173 is stored in a buffer memory 174.

For controlling the entire image reader, a CPU 185

4

comprising a RAM and a ROM is provided. CPU 185, image processor 173, buffer memory 174, a DMA (direct memory access) controller 180, and a small computer system interface (SCSI) controller 181 are mutually connected through a CPU bus 183.

DMA controller 180 transfers image data stored in buffer memory 174 to SCSI controller 181 directly. An external equipment such as a computer transmits a control command for the image reader to the image reader through the SCSI controller and receives image data from the image reader. CPU 185 sets the degree of edge enhancement, the gradation level of image data, read density, etc. according to the image read control command.

Such an image reader is connected to an external equipment such as a personal computer one to one using an interface such as a SCSI. Therefore, the image reader is used exclusively by the user of the connected personal computer. When another user uses the image reader, the user has to use the personal computer connected to the image reader or connect the image reader to his personal computer.

SUMMARY OF THE INVENTION

The present invention provides a digital copying machine and an image reader provided with an interface for offline image input and output using a removable storage medium.

According to a first aspect of a digital copying machine of the present invention, the digital copying machine comprises means for reading an original image to reproduce the image data of the original image (e.g. an image scanner), means for printing an image

5

according to given image data (e.g. a laser printer), means for accessing a removable storage medium (e.g. a reader/writer of a memory card), and means for controlling the printing means according to output control data stored in the storage medium so that the printing means can print an image according to image data stored in the storage medium.

Preferably, the digital copying machine further comprises a sorter for sorting printed paper, a finisher for stapling printed paper, and means for controlling the sorter or the finisher according to output control data stored in the storage medium.

Preferably, the digital copying machine further comprises means for storing information of the functions of the printing means and the finisher into the storage medium so that the information can be used by an external equipment such as a computer for generating the output control data.

Preferably, in order to store as much information as possible into the storage medium having limited storage capacity, the image data is compressed by encoding, and the digital copying machine further comprises means for expanding the compressed image data. Preferably, the digital copying machine further comprises means for erasing output control data and image data stored in the storage medium after printing the image data.

According to the digital copying machine of the present invention as mentioned above, by storing the image data of a document, etc. prepared by an external equipment such as a personal computer and output control data into the removable storage medium, and installing the storage medium in the digital copying machine of

6

the present invention, the digital copying machine prints image data read out from the storage medium offline in a desired output form. As a result, a user can directly copy a document in copies of a predetermined number using the digital copying machine of the present invention, without the need for copying an original which is previously printed by a nearby printer. In this case, the image quality of a copy is advantageously not degraded.

Also, by controlling the sorter or finisher of the digital copying machine according to output control data stored in the storage medium, a user can specify the number of copies, a sorting or stapling method, etc. when a document, etc. is prepared by an external computer.

Furthermore, by previously storing (downloading) information of functions provided in the the digital copying machine, for example, the printing means and the sorter or finisher, a user can effectively use all the functions of the digital copying machine.

According to a second aspect of a digital copying machine of the present invention, the digital copying machine comprises means for reading an original image to reproduce the image data of the original image, means for printing an image according to given image data, means for accessing a removable storage medium, and means for controlling the image reading means according to read control data stored in the storage medium so that the image reading means can read an original image so as to produce the image data of the original image to be stored in the storage medium.

In the above aspect, preferably, in order to generate the

read control data using an external equipment such as a computer, the digital copying machine further comprises means for storing information of the function of the image reading means into the storage medium. Preferably, the digital copying machine further comprises means for compressing image data given by the image reading means.

According to the digital copying machine of the present invention as mentioned above, offline image input using an image scanner function is readily implemented. That is, read control data obtained by using the image scanner, for example, a read gradation level, a read size, an image compressing method, the degree of edge enhancement, contrast, read density, and an image data file name are stored in a removable storage medium using software executed in an external computer. Then, the storage medium is installed in the digital copying machine, an original to be read is set in the digital copying machine, an original image is read according to the read control data stored in the storage medium, and image data is stored in the storage medium. A user removes the storage medium from the digital copying machine and installs it in a personal computer, for example, and desired image data can be read out from the storage medium to the personal computer.

According to a first aspect of an image reader of the present invention, the image reader comprises an image sensor for converting optical information from an original image to an electric signal, an A/D converter for converting the electric signal given by the image sensor to a digital image signal, an

8

image processor for processing the digital image signal to produce image data, means for accessing a removable storage medium, and means for controlling the image processor according to read control data stored in the storage medium so that the image processor can produce the image data to be stored in the storage medium.

According to a second aspect of an image reader of the present invention, the image reader comprises an image sensor for converting optical information from an original image to an electric signal, an A/D converter for converting the electric signal given by the image sensor to a digital image signal, an image processor for processing the digital image signal to produce image data, an interface for transmitting the image data to an external equipment, means for accessing a removable storage medium, and means for selecting either transmitting the image data to the external equipment by the interface or storing the image data into the storage medium by the accessing means.

According to the image reader of the present invention as mentioned above, a user stores read control data, for example, a read gradation level, a read size, an image compressing method, the degree of edge enhancement, contrast, read density, and an image data file name into a removable storage medium using software executed in an external computer. Then, the storage medium is installed in the image reader of the present invention, and an original to be read is set in the image reader. The image reader of the present invention reads an original image according to the read control data stored in the storage medium, and read image data is stored into the storage medium. Thus, an offline image input

9

function is implemented. A user removes the storage medium from the image reader of the present invention and installs it in a personal computer, etc., and desired image data can be read out from the storage medium to the personal computer, etc.

By providing the image reader with the offline image input function as mentioned above, in addition to a conventional one-to-one interface with an external equipment, the image reader can be connected one to one to a personal computer of a user who uses the image reader most frequently, and other users can use the image reader using the offline image input function without changing the connection.

Also, the image reader of the present invention can output read image data offline in a different read form for each user into the storage medium. Furthermore, a user can readily generate read control data using the user interface of a personal computer, for example. Even if a computer is not connected to the image reader as in the case of a portable note-type computer, an original image can be readily read offline using a memory card, etc.

Furthermore, the image reader of the present invention can download information of the image read function of the image reader to the storage medium, so that a user can readily utilize all the functions of the image reader.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a cross-sectional view of a digital copying machine according to an embodiment of the present invention;

Fig. 2 is a block diagram showing a flow chart for a signal

in the digital copying machine in Fig. 1;

Fig. 3 shows an example of the content of a print function information file;

Fig. 4 illustrates the relationship between staple positions and position numbers;

Fig. 5 illustrates a dialog box for setting a print function by a user;

Fig. 6 illustrates the content of a print job command file;

Fig. 7 is a flow chart for a process executed by a printer driver;

Fig. 8 is a cross-sectional view of a digital copying machine provided with a finisher according to another embodiment;

Fig. 9 illustrates the content of a read function information file;

Fig. 10 illustrates a dialog box for setting a read function;

Fig. 11 illustrates the content of a scan job command file;

Fig. 12 is a flow chart for software that generates a scan job command file;

Fig. 13 is a block diagram showing a flow chart for a signal in a conventional digital copying machine;

Fig. 14 is a block diagram showing a flow chart for a signal in an image reader according to an embodiment of the present invention;

Fig. 15 is a block diagram of the image processor in Fig. 14;

Fig. 16 shows an example of the connection between an image

11

reader according to an embodiment of the present invention and an external equipment;

Fig. 17 illustrates the content of a read function information file;

Fig. 18 illustrates a dialog box for setting a read function;

Fig. 19 illustrates the content of a scan job command file;

Fig. 20 is a flow chart for software that generates a scan job command file; and

Fig. 21 is a block diagram showing a flow chart for a signal in a conventional image reader.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A digital copying machine according to an embodiment of the present invention will be described in detail below. Fig. 1 is a cross-sectional view schematically showing the internal structure of a digital copying machine of this embodiment. This digital copying machine comprises an auto document feeder (ADF) 50 provided on a glass sheet 1, an image scanner section 100 provided beneath glass sheet 1, a laser printer section 200 provided independently beneath image scanner section 100, and an operation section 300 provided at the side of glass sheet 1. Operation section 300 is provided with a PC card slot 89.

Image scanner section 100 comprises an exposure lamp 101, a first mirror 102, a constant-speed unit 103, a second mirror 104, a third mirror 105, a half-speed unit 106, a lens 107, and an image sensor 108.

Laser printer section 200 comprises a laser scanner unit 201, a mirror 202, a photoconductor drum 203, a main charging device 204, a developing device 205, a transfer charging device 206, a cleaner 207, a discharging lamp 208, a carrier belt 209, a fixing device 210, a guide 211, a paper discharge roller 212, paper feed rollers 213, 214 and 215, a guide 216, a timing roller 217, paper cassettes 218, 219 and 220, and a sorter 221. Laser scanner unit 201 comprises a semiconductor laser, a polygonal motor, a polygonal mirror, and a laser optic system.

The basic operation of this digital copying machine will be described below. A plurality of originals put on ADF 50 are set downward on transparent glass sheet 1 one by one. When exposure lamp 101 exposes an original, reflected light from the original is reflected to second mirror 104 by first mirror 102. Constant-speed unit 103 comprising exposure lamp 101 and first mirror 102 moves in the direction of an arrow P at a constant speed to scan the original. Half-speed unit 106 comprising second mirror 104 and third mirror 105 further reflects the reflected light from first mirror 102 and moves in the same direction as that of constant-speed unit 103 at half the speed of constant-speed unit 103. The reflected light from the original through half-speed unit 106 is focused by lens 107 to be focused on image sensor 108.

Photoconductor drum 203 rotates in the direction of arrow R at a constant speed. Main charging device 204 charges photoconductor drum 203 uniformly. Laser beams from laser scanner unit 201 are reflected by mirror 202 to form an electrostatic latent image on photoconductor drum 203. Developing device 205

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develops the electrostatic latent image using a toner to form a toner image on photoconductor drum 203.

Cassettes 218, 219 and 220 are removable, and plural types of paper having different combinations of paper sizes and directions are held in respective cassettes. Paper feed rollers 213, 214 and 215 feed sheets of paper in the cassettes one by one. Guide 216 guides the fed paper to timing roller 217. Timing roller 217 controls paper feed timing to register the fed paper to the toner image on photoconductor drum 203. The toner image on photoconductor drum 203 is transferred to the paper by the electric field generated by transfer charging device 206. Carrier belt 209 moves in the direction of an arrow Q to carry the paper to fixing device 210. Fixing device 210 fixes the toner on the paper by heat.

The paper from fixing device 210 is guided to sorter 221 through guide 211 and paper discharge roller 212. Sorter 221 comprises a plurality of paper discharge trays (bins) and performs sorting in copying for each copy. Also, sorter 221 comprises a staple function and a punch function. Cleaner 207 removes any residual toner on photoconductor drum 203. Discharging lamp 208 exposes photoconductor drum 203 to eliminate the electric charge on photoconductor drum 203.

Next, the flow of a signal in the digital copying machine of this embodiment will be described by referring to Fig. 2. Reflected light from an original obtained by scanning the original is converted to an electric signal by an image sensor 71, and then converted to a digital image signal by an A/D converter 72. This

1 4

digital image signal is subjected to image processing such as edge enhancement, trimming, and halftone processing, and edit processing in an image processor 73. An image signal from image processor 73 is stored in a buffer memory 74 for controlling a speed to be given to a laser driver 78. Laser driver 78 drives a semiconductor laser 79, and an electrostatic latent image is formed on the drum by laser beams from semiconductor laser 79.

Buffer memory 74 is connected to a page memory 84. Page memory 84, a CPU 85, a LAN controller 80, a parallel I/F 81, a communication control unit (CCU) 82, a compressor/expander 86, and a PC card controller 88 are mutually connected by a CPU bus 83.

CPU 85 comprises a RAM and a ROM and controls the entire digital copying machine. Page memory 84 has capacity that can store at least one page of image data. Image data stored in page memory 84 is given to laser driver 78 through buffer memory 74 to be printed on paper.

LAN controller 80 communicates with an external equipment through a local area network (LAN). When the digital copying machine is used as a facsimile transmission server, an external equipment such as a computer transmits the telephone number of a transmit destination and image data to the digital copying machine through the LAN. CPU 85 controls compressor/expander 86 to compress the image data received from the external equipment through the LAN as required.

CCU 82 transmits the image data compressed in compressor/expander 86 to an external facsimile through a public network using a modem 87.

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Also, using parallel I/F 81, the digital copying machine and an external equipment can be connected one to one. In this case, the digital copying machine can be controlled from a nearby computer. By executing dedicated software for controlling a digital copying machine on a computer connected to the digital copying machine, a copy mode such as the numbers of pages and copies, a paper size, copy density, a magnification rate, both side copy, and a sorting method can be set. Also, complicated edit setting such as the setting of frame erasure or a trimming area, or the setting of the reversal and its area can be done using the display and the mouse of the computer.

Image data received by facsimile is expanded in compressor/expander 86, transferred to page memory 84, and printed. Image data read for facsimile transmission is stored in page memory 84, compressed in compressor/expander 86, and transmitted to an external facsimile through CCU 82 and modem 87.

PC card controller 88 controls an access from CPU 85 to the memory card installed in a PC card slot 89. If a print job command file storing print control data and an image data file to be printed exist in the memory card installed in PC card slot 89, this digital copying machine prints image data according to the print control data.

In the digital copying machine, installation of optional equipment such as a sorter and a finisher and an edit function to be set differ according to individual option structures. By storing information of a printer function into the memory card as a print function information file, usable functions can be readily

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utilized offline. The detail of this offline print function will be described later.

Also, if a scan job command file storing read control data exists in the memory card installed in PC card slot 89, this digital copying machine reads the image of a set original according to the read control data and generates an image data file to be stored into the memory card. Reading of an original is started when a user pushes a start button of operation section 300 after setting the original. In the digital copying machine, installation of an optional equipment such as an ADF and an image read function differs according to individual option structures. By storing information of the image read function of an image scanner into the memory card as an image read function information file, usable functions are easily utilized offline. The detail of this offline image input function will be described later.

Offline print function

An offline print function in the digital copying machine of this embodiment will be described. A user previously installs his memory card in the digital copying machine and downloads a print function information file to the memory card. An example of the content of a print function information file is shown in Fig. 3.

The content of the print function information file is shown in the following format for each row:

Function item, a list of selectable functions; or

Function item, function capability.

The first setting value in each list of selectable functions is a

17

default value. The content of the print function information file shown in Fig. 3 will be described below.

A first row: A paper size can be selected from A4, A4R, B4, A3, B5, and B5R, and the default is A4.

A second row: Resolution is selected from either 400 DPI (dots per inch) or 600 DPI, and the default is 400 DPI.

A third row: A gray level (the number of data bits per pixel) is selected from 1, 2, 4, and 8, and the default value is 1 bit.

A fourth row: An image data file format is selected from TIFF (tagged image file format), JPEG (joint photographic experts group), and PCL5 (printer control language 5), and the default is TIFF.

A fifth row: When TIFF is selected as the image data file format, a data compressing method is selected from G3 (MH), G4 (MMR), RLE (run length), and LZW (Lenpel-Ziv-Walsh), and the default is G3.

A sixth row: A both side print function can be used. Whether using the function or not can be set, and a one side print in which the both side print function is not used is set as a default.

A seventh row: A center binding function can be used. When the center binding function is used, page order is rearranged to print two pages on one side of paper having twice the area size of an image. The center binding function is not used as a default.

An eighth row: A sorter can be used. Nonuse of the sorter, stacking for each page, or sorting for each copy can be specified.

The default is nonuse of the sorter.

A ninth row: The number of the paper discharge trays of the sorter is 20. Therefore, more than 20 copies can not be sorted.

A tenth row: When the sorter function is used, the maximum number of paper sheets that can be stacked in each tray is 100.

An eleventh row: A stapler can be used, and it is not used as a default.

A twelfth row: When the stapler is used, a staple position can be selected from positions 1-4. The default is position 1. The relationship between positions 1-4 and the actual staple positions is shown in Fig. 4.

A thirteenth row: When the stapler is used, the maximum number of paper sheets that can be stapled is as shown.

A fourteenth row: A puncher can be used, and it is not used as a default.

A fifteenth row: When the puncher is used, the maximum number of paper sheets that can be punched is as shown.

A user produces a document or an image using application software for producing document/image such as word processor or desk top publishing (DTP) software executed on a personal computer. Printer driver software for the digital copying machine of this embodiment is previously installed in the user's personal computer. When the document or the image produced by the user is printed offline using the digital copying machine of the present invention, a memory card to which a print function information file is downloaded is installed in the user's personal computer. The user starts the printer driver from the application software for

producing document/image. The printer driver refers to the print function information file stored in the memory card to display a dialog box for setting the print function of the digital copying machine on the personal computer display.

An example of a dialog box corresponding to the print function information file in Fig. 3 is shown in Fig. 5. In Fig. 5, box areas on the right side of "START Page-END Page", "Copies", and "Data File Name" are edit boxes. A print start page, an end page, the number of copies, and an image data file name are entered in respective edit boxes. Marks ○ are radio buttons that are alternatively selected. Marks ● indicate selected functions. When TIFF is selected as the image data file format, "TIFF Compression" is valid. When "Sort" is set for "Sorting Condition", the printer driver checks the "Max Sort" and "Max Stack" values of the print function information file, and if the values are inconsistent with the setting of the numbers of copies and pages, the printer driver warns the user. Similarly, when the staple function or the punch function is used, the printer driver checks the "Max Staple Sheets" and "Max Punch Sheet" values of the print function information file, and if the values are inconsistent with the setting of the numbers of copies and pages, the printer driver warns the user.

The user clicks an OK button by the mouse after setting each function of the dialog box. The printer driver generates a print job command file and an image data file according to the setting in the dialog box and stores the files into the memory card. The content of the print job command file corresponding to

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the setting of the dialog box in Fig. 5 is shown in Fig. 6.

"Reset" of the print job command file in Fig. 6 indicates to reset

the set values of the print function to default values. For "Data

File", an image file name to be printed is written. In Fig. 5, the

image file name is "sample.tif". One image file has images of

plural pages (multi-page image). Also, one print job command file

may have a plurality of jobs. Therefore, it is possible to print

out a plurality of image files with different print function

settings.

The flow chart of the printer driver is shown in Fig. 7.

The printer driver reads the print function information file from

the memory card and displays the dialog box for setting a print

function according to the file. The user clicks the OK button

after setting each function of the dialog box. The printer driver

checks whether the setting of the dialog box is incorrect or not,

and if the setting is incorrect, the printer driver displays a

warning to urge the user to correct an incorrect part. If the

setting is correct, a print job command file and an image data file

are generated to be stored in the memory card.

The user pulls out the memory card storing the print job

command file and the image data file from the user's personal

computer and inserts the memory card into PC card slot 89. CPU 85

detects through PC card controller 88 that the memory card is

inserted and searches if the print job command file exists in the

memory card. If the print job command file exists, CPU 85 analyzes

the print job command file and performs setting required for the

control circuits of the laser printer part and the sorter part.

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CPU 85 refers to the image data file name in the print job command file to read the image data file from the memory card for printing. If the image data is compressed, CPU 85 stores the image data into page memory 84 using compressor/expander 86. When printing with center binding, the page order of the image data file is not the same as the order for printing, and therefore CPU 85 controls the printing of each page in the image data file in suitable order. When all printing as specified in the print job command file is completed, CPU 85 erases the print job command file and the image data file stored in the memory card.

By storing the image data of a document and output control data (print job command file) into the removable storage medium using a user's personal computer, and installing this storage medium in PC card slot 89 of the digital copying machine, the image data stored in the storage medium can be printed offline in a desired output form. Therefore, the user can specify the number of copies, a sorting method, and a stapling method, when the document is prepared by the personal computer. It is not necessary to print an original by a nearby printer once and copy the printed original as conventionally, and the image quality does not deteriorate. Even if the external equipment is not connected to a LAN as in the case of a portable note-type computer, offline print can be readily performed using the memory card and the digital copying machine of the present invention.

Also, for a fast-speed copying machine, the structure of optional equipment such as a sorter and a finisher varies, so that it is difficult for a user to fully use the functions of each

22

copying machine when a plurality of the copying machines are used. A digital copying machine shown in Fig. 8 is similar to the embodiment in Fig. 1 except that a finisher 222 is installed instead of sorter 221. The finisher stacks printed paper for each copy and staples the paper. Particularly in a digital copying machine, an electronic finisher for sorting for each copy is used instead of a mechanical sorter. The electronic finisher comprises mass storage means such as a hard disk device in the digital copying machine, stores the image data of read original of plural pages once, prints images of plural pages for each copy, and outputs the sorted printed paper sheets for each copy.

When finisher 222 is installed in the digital copying machine instead of mechanical sorter 221, a hard disk device is also added to the digital copying machine. Some finishers have the function of folding printed paper. Also, in some cases, optional equipment called an automatic both side unit must be installed in the digital copying machine for both side print. Thus, the print functions of digital copying machines of the same type differ according to installation of optional equipment in the copying machine. In the digital copying machine of the present invention, the print function information of the copying machine can be downloaded to the storage medium, so that a user can readily set all the print functions using the dialog box for setting a print function displayed on the personal computer even if he does not fully know the print functions of individual digital copying machines.

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Offline image input function

An offline image input function in an digital copying machine of an embodiment of the present invention will be described. A user previously installs his memory card in the digital copying machine and downloads a read function information file to the memory card. An example of the content of a read function information file is shown in Fig. 9.

The content of the read function information file is shown in the following format for each row:

Function item, a list of selectable functions; or

Function item, function capability.

The first setting value in each list of selectable functions is a default value. The content of the read function information file shown in Fig. 9 will be described below.

A first row: The size of an original to be read can be selected from Auto, A4, A4R, B4, A3, B5, and B5R, and the default is Auto. When Auto is selected, the digital copying machine automatically detects an original size.

A second row: An original setting method can be selected from Auto, ADF, and Flat Bed, and the default is Auto. When ADF is selected, an original is fed from the auto document feeder until there is no original to be read in the auto document feeder. When Flat Bed is selected, one sheet of an original put on the glass sheet is read. When Auto is selected, an original from the ADF is read if the original is in the ADF, otherwise, an original on the glass sheet is read.

A third row: The maximum value of read resolution is 400

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DPI.

A fourth row: The minimum value of read resolution is 25 DPI.

A fifth row: A gray level (the number of data bits per pixel) can be selected from 1, 2, 4, and 8 bits, and the default value is 1 bit.

A sixth row: A halftone process method can be selected from a simple binarizing process (BI), a dither process (DT), and an error diffusion process (ED). The default is the simple binarizing process (BI).

A seventh row: An image data file format can be selected from TIFF, BMP (Bitmap), and JPEG, and the default is TIFF.

An eighth row: When TIFF is selected as the image data file format, a data compressing method can be selected from G3 (MH), G4 (MMR), RLE (run length), and LZW, and the default is G3.

A ninth row: Whether a both side read function is used or not can be selected, and one side read is set as a default. (The both side read function is not used.)

A tenth row: The function of controlling contrast in reading can be selected from Auto (automatic), —2 (low contrast), —1, 0, 1, and 2 (high contrast). The default is Auto.

An eleventh row: The function of controlling read density can be selected from Auto (automatic), —2 (light), —1, 0, 1, and 2 (dark). The default is Auto.

A twelfth row: The function of controlling the degree of edge enhancement in reading can be selected from Auto (automatic), —2 (weak edge enhancement), —1, 0, 1, and 2 (strong edge

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enhancement). The default is Auto.

A thirteenth row: A read area can be specified. The default is setting in which a read area is not specified. (i.e., the entire area of an original size is read.)

A fourteenth row: The specified unit for a read area is a millimeter (mm).

For offline image input using the digital copying machine of the present invention, a user installs a memory card to which a read function information file is downloaded in his personal computer. Then, the user executes software for generating a scan job command file for the digital copying machine previously installed in the user's personal computer. This software refers to the read function information file stored in the memory card and displays a dialog box for allowing the user to set the read function of the digital copying machine on the display of the personal computer.

A schematic display of a dialog box corresponding to the read function information file in Fig. 9 is shown in Fig. 10. In Fig. 10, rectangular areas on the right side of "Scanning Resolution", "Scanning Area Upper-Left Position", "Scanning Area Length", and "Data File Name" are edit boxes for entering read resolution, an upper-left XY position of a read area, a length in the XY direction of the read area, and an image data file name respectively. Marks ○ are radio buttons that are alternatively selected. Marks ● indicate selected functions. Only when TIFF is selected as the image data file format is a selected function of "TIFF Compression" valid. Also, only when "Scanning Area Setting"

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is "Yes" are the setting values of "Scanning Area Upper-Left Position" and "Scanning Area Length" valid. Software for generating a scan job command file checks the "MAX Resolution" and "MIN Resolution" values of the read function information file, and if the values are inconsistent with the setting of "Scanning Resolution" in the dialog box, the software warns the user.

The user clicks an OK button in Fig. 10 after setting each function of the dialog box. The software for generating a scan job command file generates a scan job command file according to the setting in the dialog box and stores the file into the memory card. The content of the scan job command file corresponding to the setting of the dialog box in Fig. 10 is shown in Fig. 11. "Reset" of the scan job command file in Fig. 11 indicates to reset the set values of the read function to default values. For "Data File", the name of an image file that represents read image data is written. In Fig. 11, the image file name is "sample.tif". One image file has images of plural pages (multi-page image). Also, one scan job command file may have a plurality of jobs. Therefore, it is possible to read a plurality of original images with different read function settings.

A flow chart for the process of the software for generating a scan job command file is shown in Fig. 12. This software reads a read function information file from the memory card and displays a dialog box for setting a read function according to the file. The user clicks the OK button after setting each function of the dialog box. This software checks whether the setting of the dialog box is incorrect or not, and if the setting is incorrect, the software

displays a warning to urge the user to reset the dialog box. If the setting is correct, a scan job command file is generated to be stored in the memory card.

The user pulls out the memory card storing the scan job command file from his personal computer and inserts the memory card into PC card slot 89 of the digital copying machine of the present invention. CPU 85 detects through PC card controller 88 that the memory card is inserted and searches if the scan job command file exists in the memory card. If the scan job command file exists, CPU 85 analyzes the scan job command file and performs setting required for the control circuits of the image scanner part and ADF 50 part and image processor 73. Read image data is stored in page memory 84. CPU 85 controls compressor/expander 86 to compress the image data stored in the page memory and stores the compressed image data into the memory card with an image data file name specified in the scan job command file.

The user pulls out the memory card storing the image data file from the digital copying machine and installs the memory card in the user's personal computer. The user accesses the image data stored in the memory card using document generation/image edit software executed in the personal computer.

As mentioned above, when the image input function of the digital copying machine of the present invention is used, image read control data (scan job command file) is stored into the removable storage medium, and this storage medium is installed in the PC card slot of the digital copying machine. This allows the digital copying machine of the present invention to output read

image data offline in a desired read form into the storage medium, and the user can readily generate read control data using a user interface of the personal computer. Even if the external equipment is not directly connected to the digital copying machine of the present invention as in the case of a portable note-type computer, an original can be readily read offline using the memory card.

Also, for a copying machine, the structure of optional equipment, such as with or without an ADF, and an ADF function (e.g., whether both side can be read or not, whether an automatic detection function for an original size is included or not), with or without a slide read device, varies, so that it is difficult to specify the image read function of the copying machine. The image read functions of copying machines of the same type differ according to the installation of optional equipment in the copying machine. However, by downloading the image read function information of the copying machine to the storage medium, a user can readily utilize usable functions even if he does not fully know the image read function of the digital copying machine.

While the memory card is used as a removable storage medium in this embodiment, similar effects can be obtained using a floppy disk, optical disk, a removable hard disk, etc. Also, while a monochrome digital copying machine is described in this embodiment, the same is true for a color copying machine. Furthermore, while the function information files and the job command files are described as character data files in this embodiment, a file encoded to binary data may be used.

Next, an image reader of an embodiment of the present

invention will be described by referring to the figures. Fig. 14 is a block diagram showing a flow chart for an image signal of an image reader of the present invention. In Fig. 14, like components as in Fig. 21 are given like reference numerals. The structure and operation of the image reader will be described. An image sensor 171 scans an original to convert reflected light from the original to an electric signal (analog image signal). An A/D converter 172 converts the analog image signal from the image sensor to a digital image signal. An image processor 173 performs image processing such as edge enhancement, trimming, halftone processing, gradation level conversion, and pixel density conversion, and edit processing on the digital image signal for image data output.

A buffer memory 174 stores the image data from image processor 173. A CPU 185 comprises a RAM and a ROM and controls the entire image reader. CPU 185, a PC card controller 187, a DMA controller 180, a SCSI controller 181, and an image compressor 186 are mutually connected through a CPU bus 183.

DMA controller 180 transfers the image data stored in buffer memory 174 to image compressor 186. Image compressor 186 compresses the image data transferred from DMA controller 180 to produce compressed image data. The compressed image data is DMA transferred to SCSI controller 181 by DMA controller 180. A compressing method in image compressor 186 is selected from among a plurality of compressing methods by CPU 185. An external equipment such as a computer transmits a control command for the image reader to the image reader through SCSI controller 181 and receives compressed image data from the image reader. CPU 185 sets the

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degree of edge enhancement, an image data gradation level, read density, etc. according to the image read control command.

Personal computer (PC) card controller 187 controls an access from CPU 185 to the memory card installed in PC card slot 189. If a scan job command file storing read control data exists in the memory card installed in PC card slot 189, the image reader reads the image of a set original according to the read control data to store compressed image data into the memory card as an image data file. Reading of an original is started when a user pushes a read start button after setting the original.

In the image reader, an image read function and an image processing function differ according to an optional equipment structure, such as with or without installation of optional equipment such as an ADF. In order to adapt to these various optional equipment structures, the image reader of this embodiment has the function of storing the image read function information of an image scanner into the memory card as an image read function information file. The detail of this offline image input function will be described later.

Fig. 15 is a block diagram of image processor 173 in Fig. 14. A gamma converter 131, an edge enhancement circuit 132, a pixel density converter (zooming circuit) 133, a trimming circuit 134, and a gradation level converter 135 are connected to a CPU bus 183, and CPU 185 sets a process parameter for each circuit. Gamma converter 131 performs data conversion on a 8-bit digital image signal. Gamma converter 131 is a conversion table using a RAM having a capacity of 256 byte and a 8-bit address line. RAM data

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is downloaded from CPU 185. CPU 185 sets read density and contrast characteristics by changing the conversion table stored in the RAM.

Edge enhancement circuit 132 performs an edge enhancement process on image data using a known two-dimensional space filtering method. CPU 185 sets the degree of edge enhancement in edge enhancement circuit 132 by changing a filter factor of a space filter. Pixel density converter 133 performs pixel density conversion on image data by interpolation or thinning of the image data. CPU 185 sets the pixel density of output image data by changing the setting value of interpolation rate or thinning rate in pixel density converter 133.

Trimming circuit 134 cuts a desired rectangular area from read image data. CPU 185 sets the position and size of a cut area by changing the setting value of the cut area. Gradation level converter 135 converts image data having 8 bits per pixel (256 gradation) to N-bit image data. N is selected from 1, 4, and 8. When N is 1, any one of a simple binarizing process, a dither process, and an error diffusion process is selected as a binarizing process method. When N is 4, any one of high order N-bit extraction, a multi-value dither process, and a multi-value error diffusion process is selected as a quantizing method. When N is 8, gradation level converter 135 produces 8-bit image data unchanged. Gradation level converter 135 produces converted image data as mentioned above as a pack of 8 bit.

An exemplary connection between the image reader of the present invention and an external equipment is shown in Fig. 16. An image reader 120 and a personal computer 121 are connected one

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to one by a SCSI cable 122, and the user of personal computer 121 can directly use image reader 120 online. Also, image reader 120 comprises a PC card insertion opening where a memory card 124 is installed in and removed from. Also, memory card 124 can be installed in and removed from a note-type personal computer 125.

When the user of personal computer 125 obtains image data using image reader 120, the image data is transferred offline from image reader 120 to personal computer 125 using memory card 124.

Offline image input function

An offline image input function in the image reader of this embodiment will be described. A user previously installs his memory card 124 in image reader 120 and downloads a read function information file to the memory card. The content of a read function information file is shown in Fig. 17. The content of the read function information file shown in Fig. 17 will be explained below.

The format of the read function information file is shown as follows for each row:

Function item, a list of selectable functions;

Function item, function capability; or

"if", condition for selection, "then", function item, a list of selectable functions.

The first setting value in each list of selectable functions is a default value. The content of the read function information file shown in Fig. 17 will be explained below.

A first row: The size of an original to be read can be

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selected from Auto, A4, A4R, B4, A3, B5, and B5R, and the default is Auto. When Auto is selected, the original size is automatically detected.

A second row: An original setting method can be selected from Auto, ADF, and Flat Bed. When ADF is selected, an original is fed from the auto document feeder continuously. When Flat Bed is selected, one sheet of an original put on the glass sheet is read. When Auto is selected, an original from the ADF is read if the original is in the ADF, otherwise, an original on the glass sheet is read. The default is Auto.

A third row: The maximum value of read resolution is 1200 DPI.

A fourth row: The minimum value of read resolution is 25 DPI.

A fifth row: A gray level (the number of data bits per pixel) can be selected from 1, 4, and 8 bits, and the default value is 1 bit.

A sixth row: When 1 is selected as the gray level, a binarizing process method can be selected from any one of a simple binarizing process (BI), a dither process (DT), and an error diffusion process (ED). The default is the simple binarizing process.

A seventh row: When 4 is selected as the gray level, a quantizing process method can be selected from any one of a high order 4-bit extraction process (SIMPLE), a multi-value dither process (DT), and a multi-value error diffusion process (ED). The default is the high order 4-bit extraction process.

34

An eighth row: An image data file format can be selected from TIFF, BMP, and JPEG, and the default is TIFF.

A ninth row: When TIFF is selected as the image data file format, and 1 is selected as the gray level, a data compressing method can be selected from G3 (MH), G4 (MMR), RLE (run length), and NO (no compression), and the default is G3.

A tenth row: When TIFF is selected as the image data file format, and 4 is selected as the gray level, LZW or NO can be selected as the data compressing method, and the default is LZW.

An eleventh row: When TIFF is selected as the image data file format, and 8 is selected as the gray level, LZW, JPEG, or NO can be selected as the data compressing method, and the default is LZW.

A twelfth row: When JPEG is selected as the image data file format or the compressing method, the compression rate can be selected from any one of Normal (normal compression rate), High (high compression rate), and Low (low compression rate), and the default is Normal.

A thirteenth row: The function of controlling contrast in reading can be selected from Auto (automatic), —2 (low contrast), —1, 0, 1, and 2 (high contrast). The default is Auto.

A fourteenth row: The function of controlling read density can be selected from Auto (automatic), —2 (light), —1, 0, 1, and 2 (dark). The default is Auto.

A fifteenth row: The function of controlling the degree of edge enhancement in reading can be selected from Auto (automatic), —2 (weak edge enhancement), —1, 0, 1, and 2 (strong edge

enhancement). The default is Auto.

A sixteenth row: A read area can be specified. The default is setting in which a read area is not specified. (i.e., the entire area of an original size is read.)

A seventeenth row: The specified unit for a read area is a millimeter (mm).

When obtaining the image data of an original using the image reader of this embodiment, a user installs memory card 124 to which a read function information file is downloaded as mentioned above in the user's personal computer 125. The user executes software for generating a scan job command file for the image reader previously installed in his personal computer 125. This software refers to the read function information file stored in memory card 124 to display a dialog box for setting a read function of image reader 120 on the display of personal computer 125.

An exemplary dialog box corresponding to the read function information file in Fig. 17 is shown in Fig. 18. In Fig. 18, box areas on the right side of "Scanning Resolution", "Scanning Area Upper-Left Position", "Scanning Area Length", and "Data File Name" are edit boxes for entering read resolution, an upper-left XY position of a read area, the length in the XY direction of the read area, and an image data file name respectively. Marks ○ are radio buttons that are alternatively selected. Marks ● indicate selected functions. In Fig. 18, TIFF is selected as an image data file format, and 1 is selected as a gray level, so that G3, G4, RLE, and NO are valid as selectable "Compression" functions. Also, in Fig. 18, JPEG is not selected as a compression method nor a file

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format, so that selection of "Compression Rate" is invalid. Only when "Scanning Area Setting" is "Yes", the setting values of "Scanning Area Upper-Left Position" and "Scanning Area Length" are valid.

The software for generating a scan job command file checks the values of "MAX Resolution" and "MIN Resolution" in the read function information file, and if the values are inconsistent with the setting of "Scanning Resolution" in the dialog box, the software warns the user. Similarly, when "Paper Size" (original size) is inconsistent with the setting values of "Scanning Area Upper-Left Position" and "Scanning Area Length", the software warns the user.

The user clicks an OK button in Fig. 18 after setting each function of the dialog box. The software for generating a scan job command file generates a scan job command file according to the setting in the dialog box and stores the file into memory card 124. The content of the scan job command file corresponding to the setting of the dialog box in Fig. 18 is shown in Fig. 19.

"Reset" of the scan job command file in Fig. 19 indicates to reset the set values of the read function to default values. For "Data File", the name of an image file that stores read image data is written. In Fig. 19, the image file name is "sample.tif". One image file has images of plural pages (multi-page image). Also, one scan job command file may have a plurality of jobs. Therefore, it is possible to read a plurality of originals changing read function settings.

A flow chart of the process of the software for generating

a scan job command file is shown in Fig. 20. This software reads the read function information file from memory card 124 (step S1), and displays a dialog box for setting a read function according to the file (step S2). The user clicks the OK button after setting each function of the dialog box (step S3). This software checks whether the setting of the dialog box is incorrect or not (step S4), and if the setting is incorrect, the software displays a warning (step S5) to urge the user to reset the dialog box. If the setting is correct, a scan job command file is generated (step S6) to be stored in memory card 124.

Next, the user pulls out memory card 124 storing the scan job command file from his personal computer 125 and inserts memory card 124 into PC card slot 189 of image reader 120. CPU 185 in image reader 120 detects through PC card controller 187 that memory card 124 is inserted and searches if the scan job command file exists in memory card 124. If the scan job command file exists, CPU 185 analyzes the scan job command file and performs setting required for image processor 173. Image data read by image sensor 171 are stored in memory card 124 installed in the PC card slot as an image data file through buffer memory 174, image compressor 186, and PC card controller 187.

The user pulls out memory card 124 storing the image data file from image reader 120 and again installs the memory card in his personal computer 125. The user utilizes the image data read out from memory card 124 by using document generation/image edit software executed in personal computer 125.

While the memory card is used as a removable storage medium

3 8

in the image reader of this embodiment, similar effects can be obtained using a floppy disk, optical disk, a removable hard disk, etc. Also, while a monochrome image reader is described in this embodiment, the same is true for a color image reader. Furthermore, while the function information file and the job command file are character data files in this embodiment, a file encoded to binary data may be used.

The invention may be embodied in other forms without departing from the spirit or essential characteristics thereof. The embodiments disclosed in this application are to be considered in all respects as illustrative and not limitative, the scope of the invention is indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are intended to be embraced therein.

What is claimed is:

1. A digital copying machine comprising:

means for reading an original image so as to reproduce image data of said original image;

means for printing an image according to given image data;

means for accessing a removable storage medium; and

means for controlling said printing means according to output control data stored in a removable storage medium so that said printing means can print an image according to image data stored in a removable storage medium.

2. The digital copying machine according to claim 1, further comprising a sorter for sorting printed paper, and means for controlling said sorter according to output control data stored in a removable storage medium.

3. The digital copying machine according to claim 1, further comprising a finisher for stapling printed paper, and means for controlling said finisher according to output control data stored in a removable storage medium.

4. The digital copying machine according to claim 2, further comprising means for storing information of functions of said printing means and sorter into a removable storage medium so that said information can be used by an external equipment for generating output control data.

5. The digital copying machine according to claim 3, further comprising means for storing information of functions of said printing means and finisher into a removable storage medium so that

said information can be used by an external equipment for generating output control data.

6. The digital copying machine according to claim 1, wherein the removable storage medium is a memory card.

7. The digital copying machine according to claim 1, wherein compressed image data is stored in a removable storage medium and said machine further comprises means for expanding said compressed image data read out from the removable storage medium.

8. The digital copying machine according to claim 1, further comprising means for erasing said image data and output control data stored in a removable storage medium, after printing said image data.

9. A digital copying machine comprising:

means for reading an original image so as to reproduce image data of said original image;

means for printing an image according to given image data;

means for accessing a removable storage medium; and

means for controlling said image reading means according to read control data stored in a removable storage medium so that said image reading means can read an original image so as to produce image data of said original image to be stored in a removable storage medium.

10. The digital copying machine according to claim 9, further comprising means for storing information of functions of said image reading means into a removable storage medium so that said information can be used by an external equipment for generating said read control data.

11. The digital copying machine according to claim 9, wherein the removable storage medium is a memory card.

12. The digital copying machine according to claim 9, further comprising means for compressing said image data given by said image reading means.

13. An image reader comprising:

an image sensor for converting optical information from an original image into an electric signal;

an analog-to-digital converter for converting said electric signal given by said image sensor into a digital image signal;

an image processor for processing said digital image signal to produce image data;

means for accessing a removable storage medium; and

means for controlling said image processor according to read control data stored in a removable storage medium so that said image processor can produce said image data to be stored in a removable storage medium.

14. An image reader comprising:

an image sensor for converting optical information from an original image into an electric signal;

an analog-to-digital converter for converting said electric signal given by said image sensor into a digital image signal;

an image processor for processing said digital image signal to produce image data;

an interface for transmitting said image data to an external equipment;

means for accessing a removable storage medium; and

means for selecting either transmitting said image data to said external equipment by said interface or storing said image data into a removable storage medium by said accessing means.

15. The image reader according to claim 14, further comprising means for controlling said image processor according to read control data stored in a removable storage medium, so that image data is stored in the removable storage medium.

16. The image reader according to claim 13, further comprising means for storing information of functions of said image processor into a removable storage medium so that said information can be used by an external equipment for generating said read control data.

17. The image reader according to claim 14, further comprising means for storing information of functions of said image processor into a removable storage medium so that said information can be used by an external equipment for generating read control data.

18. The image reader according to claim 13, wherein the removable storage medium is a memory card.

19. The image reader according to claim 14, wherein the removable storage medium is a memory card.

20. The image reader according to claim 13, further comprising means for compressing said image data given by said image processor.

21. The image reader according to claim 14, further comprising means for compressing said image data given by said image processor.

22. A method for performing operations on a digital copying

43

machine, comprising steps of:

    (a)   reading an original image to reproduce image data of said original image;

    (b)   retrieving output control data stored in a removable storage medium; and

    (c)   printing an image with a printer on a print medium based on the image data according to the output control data.

23. The method of claim 22, further comprising a step of sorting print medium with a sorter according to the output control data.

24. The method of claim 23, further comprising a step of storing information of functions of the printer and the sorter into a removable storage medium so that said information can be used by external equipment for generating output control data.

25. The method of claim 22, further comprising a step of stapling the print medium with a finisher according to the output control data.

26. The method of claim 25, further comprising a step of storing information of functions of the printer and the finisher into a removable storage medium so that said information can be used by external equipment for generating output control data.

27. The method of claim 22, further comprising a step of storing the image data in the removable storage medium.

28. The method of claim 22, further comprising steps of:

    (d)   storing image data as compressed image data in the removable storage medium; and

(e) reading out the image data from the removable storage

medium by expanding the compressed image data.

29. The method of claim 22, further comprising a step of

erasing output control data stored in the removable storage medium,

after printing the image data.

30. The method of claim 27, further comprising a step of

erasing the image data stored in the removable storage medium,

after printing the image data.

ABSTRACT OF THE DISCLOSURE

A digital copying machine comprising an image scanner part for reading an original image to reproduce image data of the original image, a laser printer part for printing an image according to given image data, a removable memory card, and a reader/writer of the memory card is provided. For offline print, the image data of a document prepared in an external computer and output control data are stored into the memory card. By installing this memory card in the digital copying machine, the digital copying machine prints the image data read out from the memory card offline in a desired output form. For offline image input, read control data obtained by using an image scanner such as a read gradation level, a read size, density, and the degree of edge enhancement is stored in the removable memory card using software executed in an external computer. By installing this storage medium in the digital copying machine and setting an original to be read in the digital copying machine, the original image is read according to the read control data stored in the memory card, and the obtained image data is stored into the memory card.

FIG. 1

FIG. 2

71 image sensor

72 A/D converter

73 image processor

74 buffer memory

78 laser driver

79 semiconductor laser

80 LAN controller

81 parallel I/F

82 CCU

83

84 page memory

85 CPU

86 compressor/ expander

87 modem

88 pc card controller

89 pc card slot
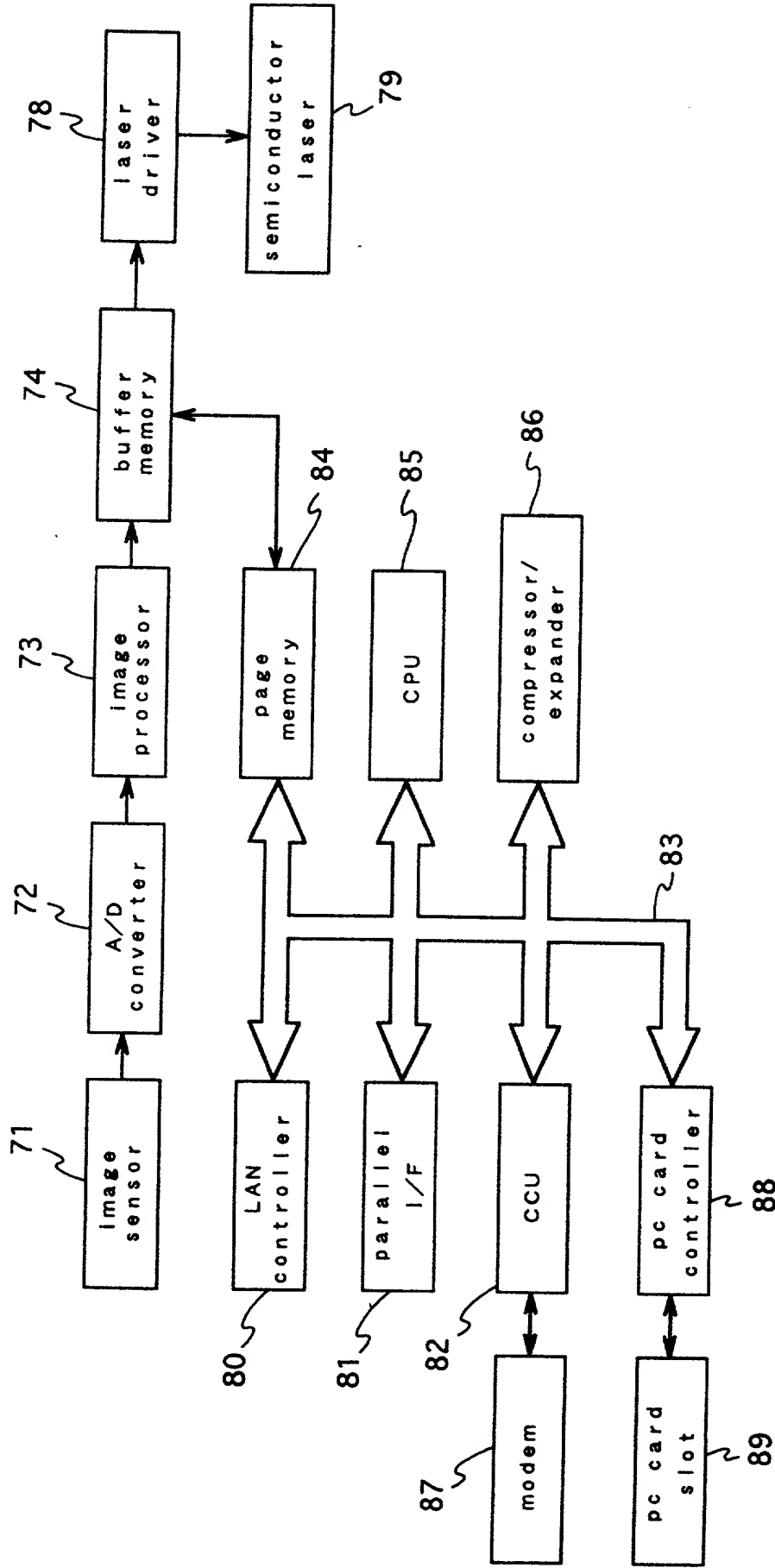
```
PaperSize          A4, A4R, B4, A3, B5, B5R

Resolution         400, 600

GrayLevel          1, 2, 4, 8

FileFormat         TIFF, JPEG, PCL5

        TIFFCompression  G3, G4, RLE, LZW

BothSidePrint   No, Yes

CenterBinding   No, Yes

Sort               No, Stack, Sort

    MaxSort        20

    MaxStack       100

Staple          No, Yes

    StaplePosition   1, 2, 3, 4

    MaxStapleSheets  50

Punch           No, Yes

MaxPunchSeet    50
```

F I G.   3

position 1

position 2

position 3

position 4
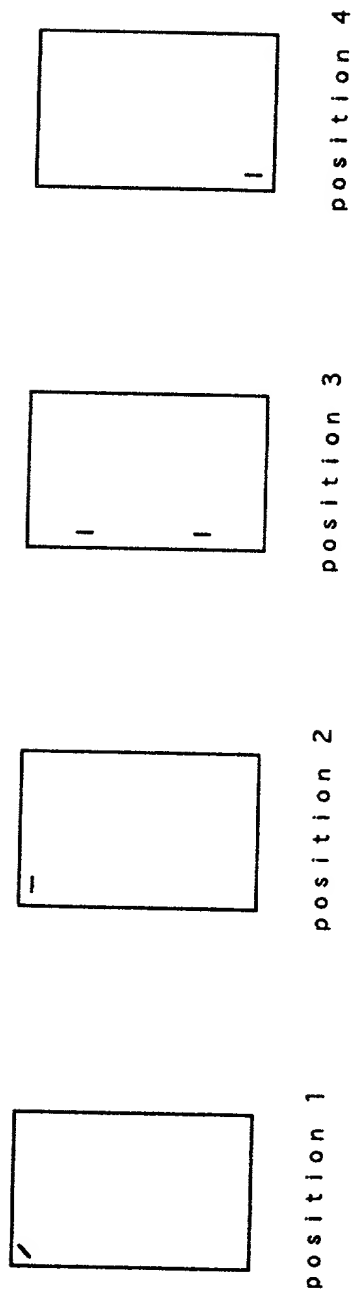
F I G. 4

```
Printing Function Dialong Box

START Page-END Page        1                    999

Copies                     13

Paper Size                 ●A4 ○A4R ○B4 ○A3 ○B5 ○B5R

Resolution [DPI]           ○400 ●600

Gray Level [BIT/PIXEL]     ●1  ○2  ○4  ○8

File Format                ●TIFF   ○JPEG ○PCL5

    TIFF Compression       ○G3 ●G4 ○RLE ○LZW

Both Side Printing         ○No     ●Yes

Center Binding             ●No     ○Yes

Sorting Condition          ○No     ○Stack ●Sort

Staple                     ○No     ●Yes

    Staple Position        ●1  ○2  ○3  ○4

Punch                      ●No     ○Yes

Data File Name                   sample

                              OK            Cancel
```

F I G.   5

```
Reset

Copies            13

PaperSize         A4

Resolution        600

GrayLevel         1

FileFormat        TIFF

       TIFFCompression G4

BothSidePrint     Yes

CenterBinding     No

Sort              Sort

Staple            Yes

    StaplePosition 1

Punch             No

DataFile          sample.tif
```

F I G.   6

```
                    ┌─────────────────────────┐
                    │  read print function    │
                    │   information file       │
                    └─────────────────────────┘
                                 │
                                 ▼
                    ┌─────────────────────────┐
                    │  display print function  │
                    │  setting dialong box      │
                    └─────────────────────────┘
                                 │
                                 │◄──────────────────────────────┐
                                 ▼                                │
                              ╱──────╲                            │
                             ╱ OK button? ╲───── No ──────────────┤
                             ╲          ╱                         │
                              ╲──────╱                            │
                                 │ Yes                            │
                                 │                    ┌─────────────────────┐
                                 │                    │  display warning     │
                                 ▼                    └─────────────────────┘
                              ╱──────╲                         ▲
                             ╱ set data ╲                      │
                             ╲ incorrect? ╲──── Yes ───────────┘
                              ╲──────╱
                                 │ No
                                 ▼
                    ┌─────────────────────────┐
                    │  generate print job      │
                    │   command file           │
                    └─────────────────────────┘
                                 │
                                 ▼
                    ┌─────────────────────────┐
                    │   generate image         │
                    │    data file             │
                    └─────────────────────────┘
```

F I G. 7

FIG. 8

```
PaperSize           Auto,A4, A4R, B4, A3, B5, B5R

PaperFeed           Auto, ADF, FlatBed

MAXResolution       400

MINResolution       25

GrayLevel           1,2,4,8

      Halftone          BI, DT, ED

FileFormat          TIFF, BMP, JPEG

    TIFFCompression     G3, G4, RLE, LZW

BothSideScan        No, Yes

Contrast            Auto, -2, -1, 0, 1, 2

Density             Auto, -2, -1, 0, 1, 2

EdgeEnhance         Auto, -2, -1, 0, 1, 2

ScanArea            No, Yes

      ScanAreaUnit    mm
```

F I G. 9

```
┌─────────────────────────────────────────────────────────────────────┐
│ Scanning Function Dialong Box                                         │
├─────────────────────────────────────────────────────────────────────┤
│                                                                       │
│ Paper Size                    ●Auto  ○A4  ○A4R  ○B4  ○A3  ○B5  ○B5R  │
│                                                                       │
│ Paper Feed                    ●Auto   ○ADF   ○FlatBed                 │
│                                                                       │
│ Scanning Resolution [DPI]       ┌─────┐                              │
│                                 │ 100 │   [25-400]                    │
│                                 └─────┘                              │
│ Gray Level [BIT/PIXEL] ●1   ○2   ○4   ○8                            │
│                                                                       │
│ Halftone Processing     ●Binarzing    ○Dithering    ○Error Diffusion │
│                                                                       │
│ File Format             ●TIFF   ○BMP   ○JPEG                         │
│                                                                       │
│       TiFF Compression  ○G3  ●G4  ○RLE  ○LZW                        │
│                                                                       │
│ Both Side Scanning      ○No   ●Yes                                   │
│                                                                       │
│ Contrast                ●Auto ○-2 ○-1 ○0 ○1 ○2                      │
│                                                                       │
│ Density                 ●Auto ○-2 ○-1 ○0 ○1 ○2                      │
│                                                                       │
│ Edge Enhancement        ●Auto ○-2 ○-1 ○0 ○1 ○2                      │
│                                                                       │
│ Scanning Area Setting ○No  ●Yes                                      │
│                                              ┌──────┐   ┌──────┐     │
│ Scanning Area Upper-Left Position [mm] X=    │  10  │Y= │  20  │     │
│                                              ├──────┤   ├──────┤     │
│ Scanning Area Length  Upper-Left [mm] X=     │  60  │Y= │  70  │     │
│                              ┌───────────────┴──────┘   └──────┘     │
│ Data File Name               │ sample                               │
│                              └──────────────────────┘                │
│                          ┌────────┐      ┌────────┐                  │
│                          │   OK   │      │ Cancel │                  │
│                          └────────┘      └────────┘                  │
│                                                                       │
└─────────────────────────────────────────────────────────────────────┘


                          F I G.    1 0
```

```
Reset

PaperSize        Auto

PaperFeed        Auto

Resolution       100

GrayLevel        1

Halftone         Bi

FileFormat       TIFF

        TIFFCompression G4

BothSideScan Yes

Contrast         Auto

Density          Auto

EdgeEnhance      Auto

ScanArea         Yes

ScanAreaPosition 10, 20

ScanAreaLength    60, 70

DataFile         sample.tif
```

FIG. 11

```
        ┌─────────────────────┐
        │ read read function  │
        │  information file   │
        └─────────────────────┘
                   │
                   ▼
        ┌─────────────────────┐
        │ display read function│
        │ setting dialong box  │
        └─────────────────────┘
                   │
                   │         ◄──────────────────────────────┐
                   ▼                                         │
              ◇ OK button? ◇────No──────────────────────────►│
                   │                                         │
                  Yes                                        │
                   │                        ┌────────────────────┐
                   │                        │  display warning   │
                   │                        └────────────────────┘
                   ▼                                 ▲
              ◇ set data ◇────Yes─────────────────────┘
              ◇ incorrect? ◇
                   │
                  No
                   │
                   ▼
        ┌─────────────────────┐
        │  generate scan job  │
        │    command file     │
        └─────────────────────┘
```

F I G.   12

FIG. 13 (PRIOR ART)

F I G. 14

F I G. 15

121

122

120

123

124

125
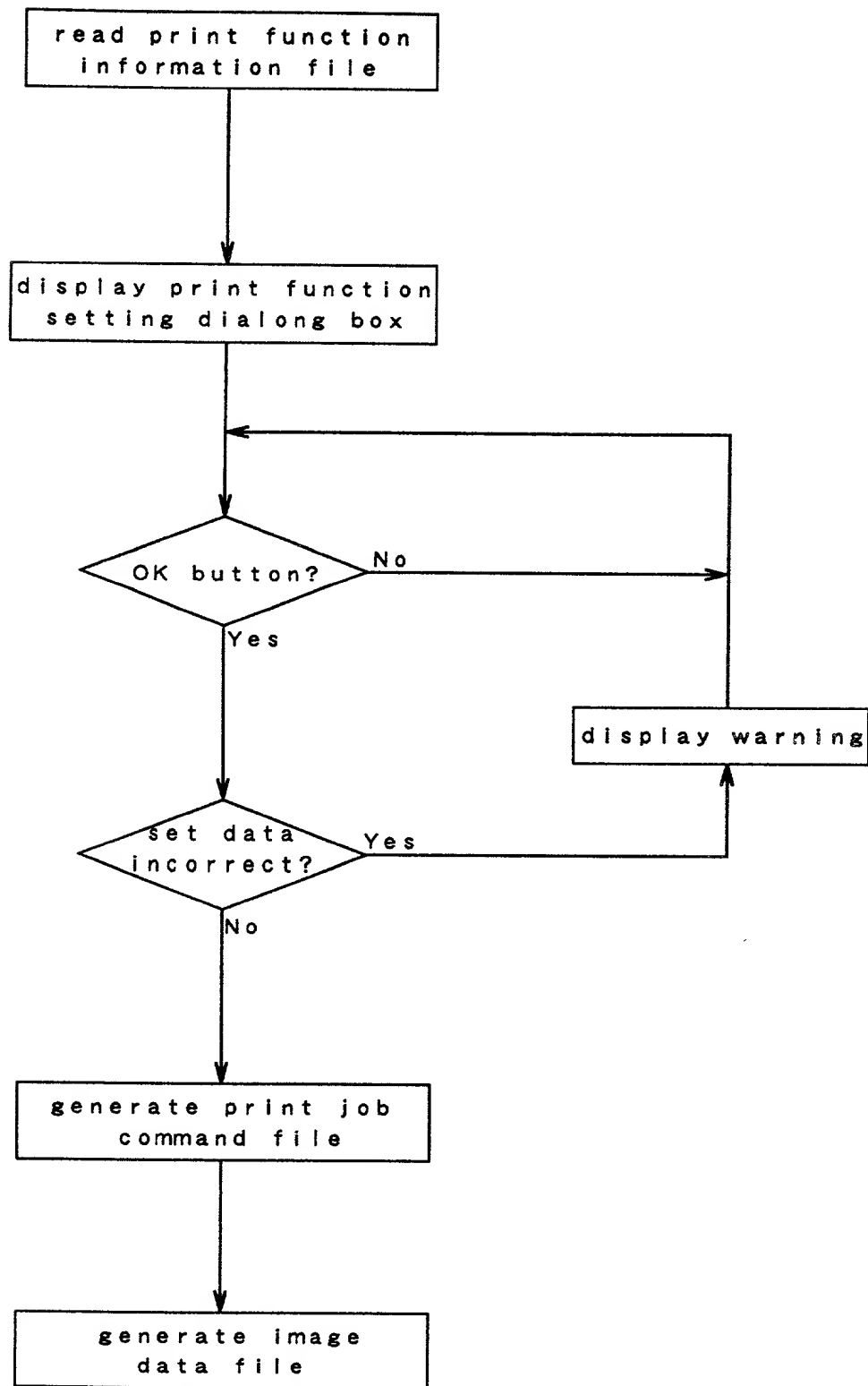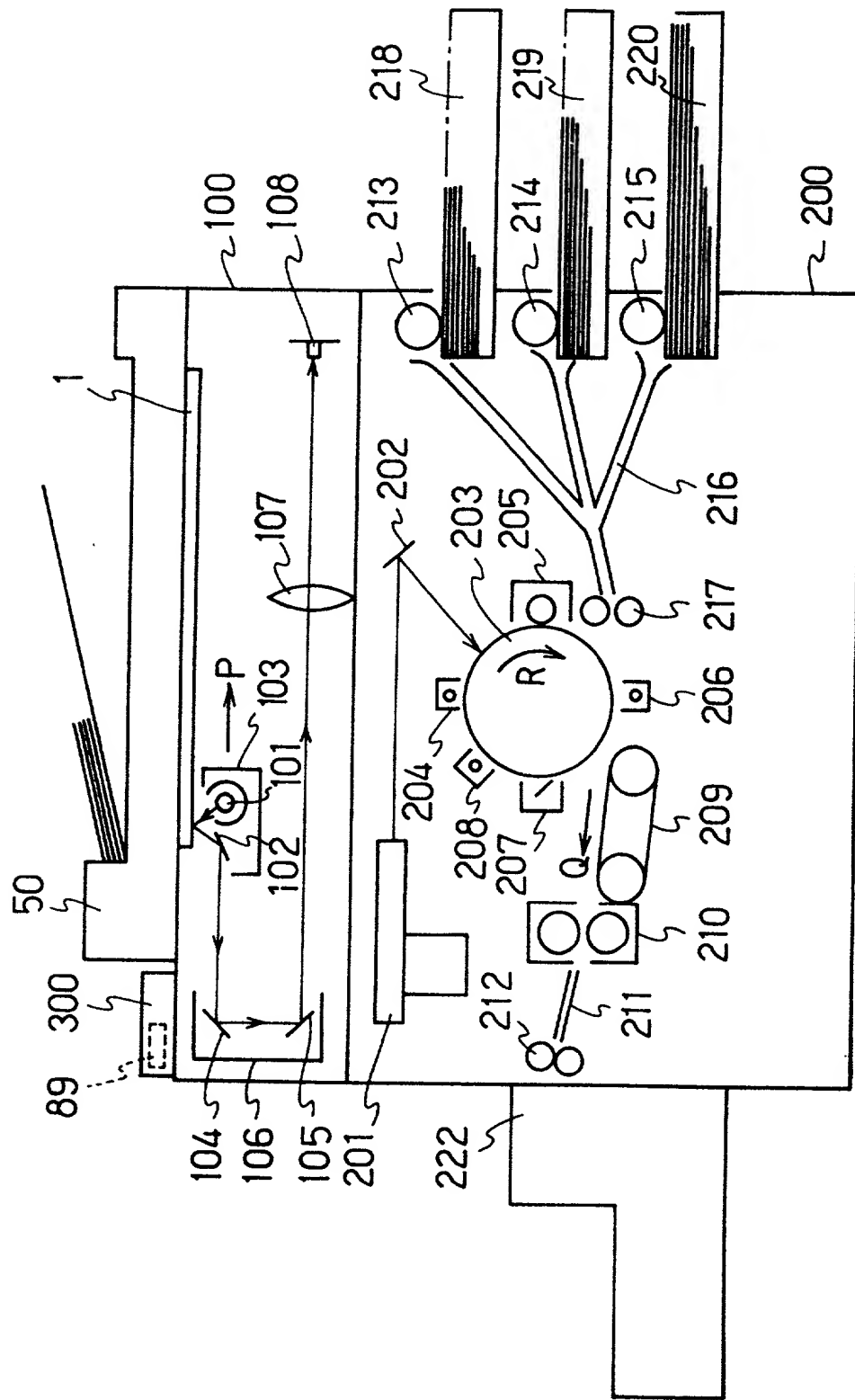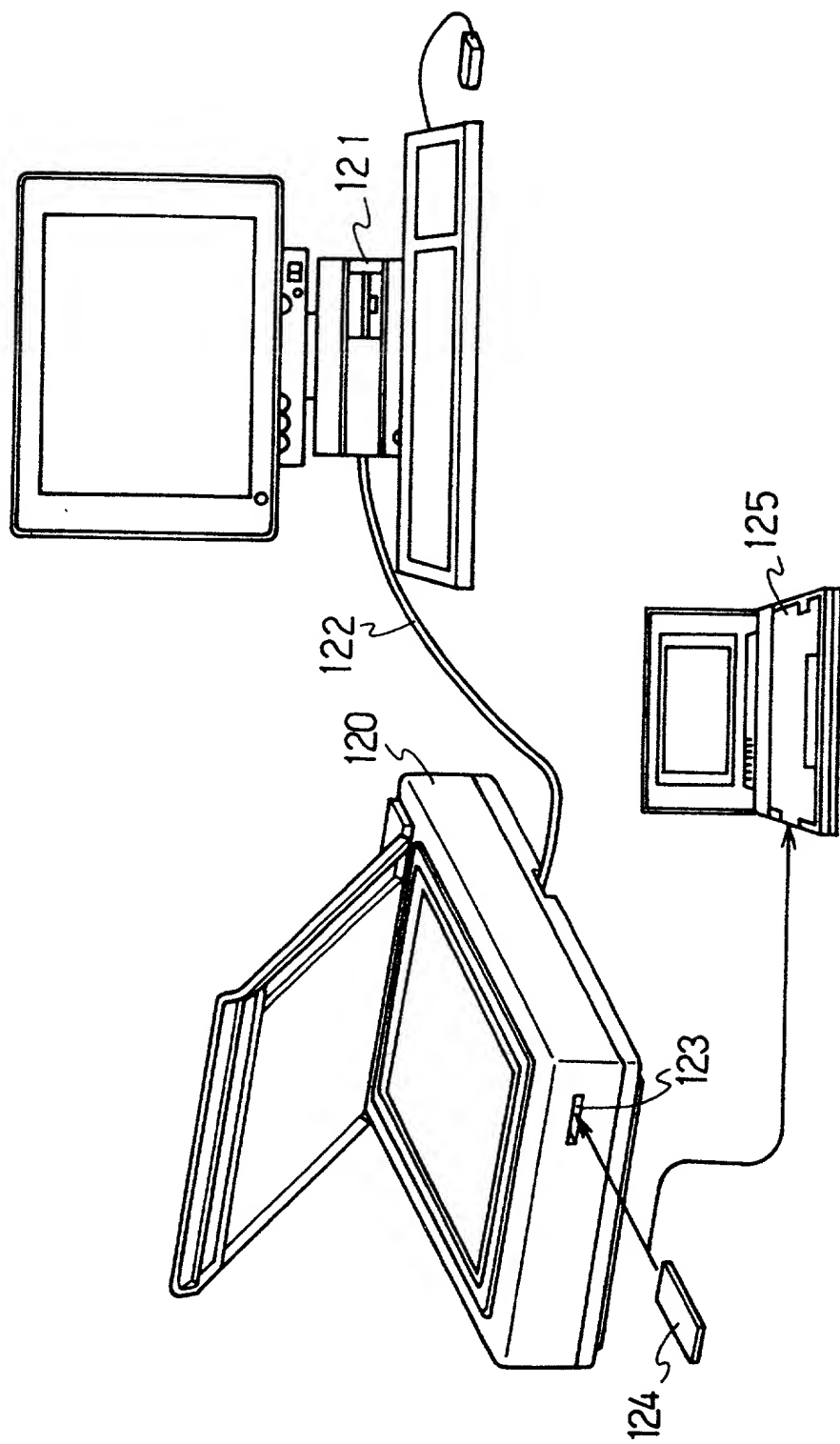
F I G. 16

```
PaperSize          Auto,A4, A4R, B4, A3, B5, B5R

PaperFeed          Auto, ADF, FlatBed

MAXResolution      1200

MINResolution      25

GrayLevel          1, 4, 8

   if GrayLevel==1 then Halftone BI,DT, ED

   if GrayLevel==4 then Quantizing SIMPLE, DT, ED

FileFormat         TIFF, BMP, JPEG

if File Format== TIFF && Gray Level==1 then Compression G3,G4,RLE,NO

if File Format== TIFF && Gray Level==4 then Compression LZW,NO

if File Format== TIFF && Gray Level==8 then Compression LZW,JPEG,NO

if File Format ==JPEG||Compression==JPEG then Compression Rate Normal,High,Low

Contrast           Auto, −2, −1, 0, 1, 2

Density            Auto, −2, −1, 0, 1, 2

EdgeEnhance        Auto, −2, −1, 0, 1, 2

ScanArea           No, Yes

     ScanAreaUnit   mm
```

F I G. 17

```
┌─────────────────────────────────────────────────────────────────┐
│ Scanning Function Dialong Box                                     │
├───────────────────────────────────────────────────────────────────┤
│ Paper Size              ●Auto  ○A4  ○A4R  ○B4  ○A3  ○B5  ○B5R     │
│                                                                    │
│ Paper Feed              ●Auto  ○ADF  ○FlatBed                      │
│                                                                    │
│ Scanning Resolution [DPI]    ┌─────┐  [25-1200]                    │
│                              │ 100 │                               │
│                              └─────┘                               │
│ Gray Level [BIT/PIXEL]  ●1  ○4  ○8                                │
│                                                                    │
│ Halftone Processing     ●Binarzing    ○Dithering    ○Error Diffusion│
│                                                                    │
│ File Format             ●TIFF  ○BMP  ○JPEG                         │
│                                                                    │
│     Compression         ○G3  ●G4  ○RLE  ○JPEG  ○NO                │
│                                                                    │
│     Compression Rate    ○High  ●Normal  ○Low                      │
│                                                                    │
│ Contrast                ●Auto  ○-2  ○-1  ○0  ○1  ○2               │
│                                                                    │
│ Density                 ●Auto  ○-2  ○-1  ○0  ○1  ○2               │
│                                                                    │
│ Edge Enhancement        ●Auto  ○-2  ○-1  ○0  ○1  ○2               │
│                                                                    │
│ Scanning Area Setting   ○No  ●Yes                                 │
│                                                                    │
│ Scanning Area Upper-Left Position [mm] X=┌────┐ Y=┌────┐          │
│                                          │ 10 │   │ 20 │          │
│                                          └────┘   └────┘          │
│ Scanning Area Length  Upper-Left [mm] X=┌────┐ Y=┌────┐           │
│                                         │ 60 │   │ 70 │           │
│                                         └────┘   └────┘           │
│ Data File Name          ┌──────────────────┐                      │
│                         │    sample        │                      │
│                         └──────────────────┘                      │
│                                                                    │
│                  ┌────────┐         ┌────────┐                    │
│                  │   OK   │         │ Cancel │                    │
│                  └────────┘         └────────┘                    │
└─────────────────────────────────────────────────────────────────┘
```

F I G.   18

```
Reset

PaperSize       Auto

PaperFeed       Auto

Resolution      100

GrayLevel       1

Halftone        BI

FileFormat      TIFF

        Compression G4

Contrast        Auto

Density         Auto

EdgeEnhace      Auto

ScanArea        Yes

ScanAreaPosition 10, 20

ScanAreaLength   60, 70

DataFile        sample.tif
```
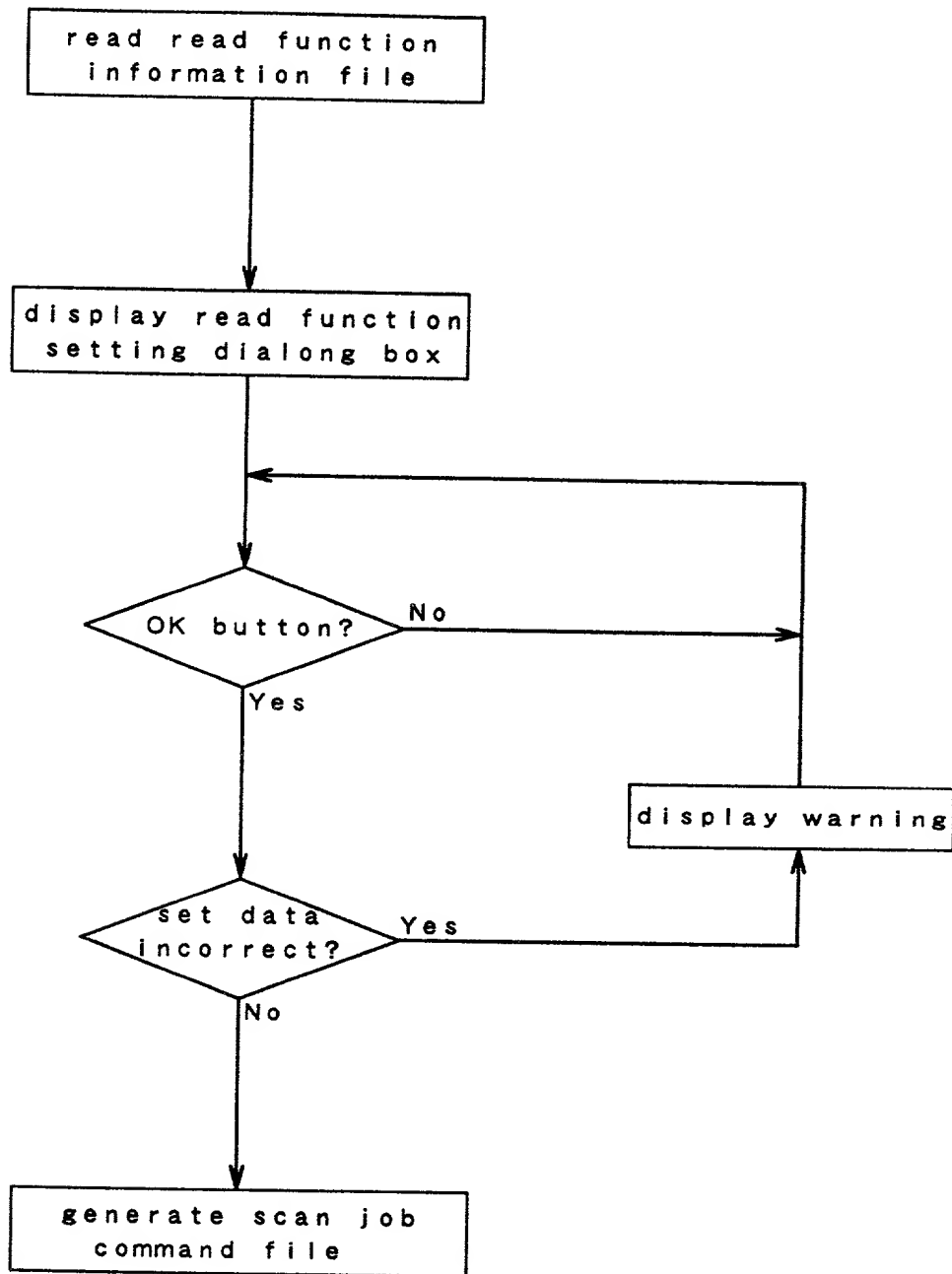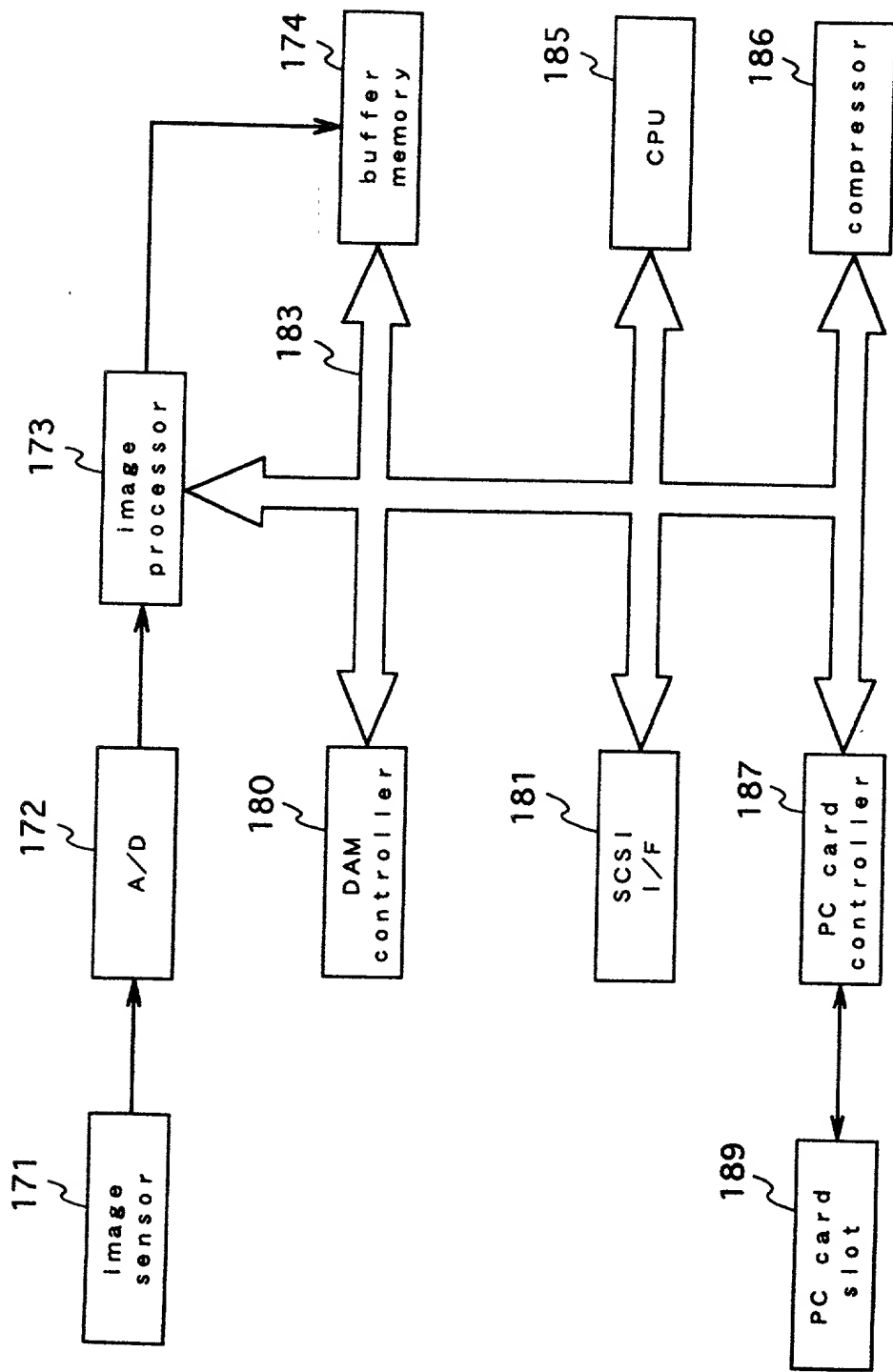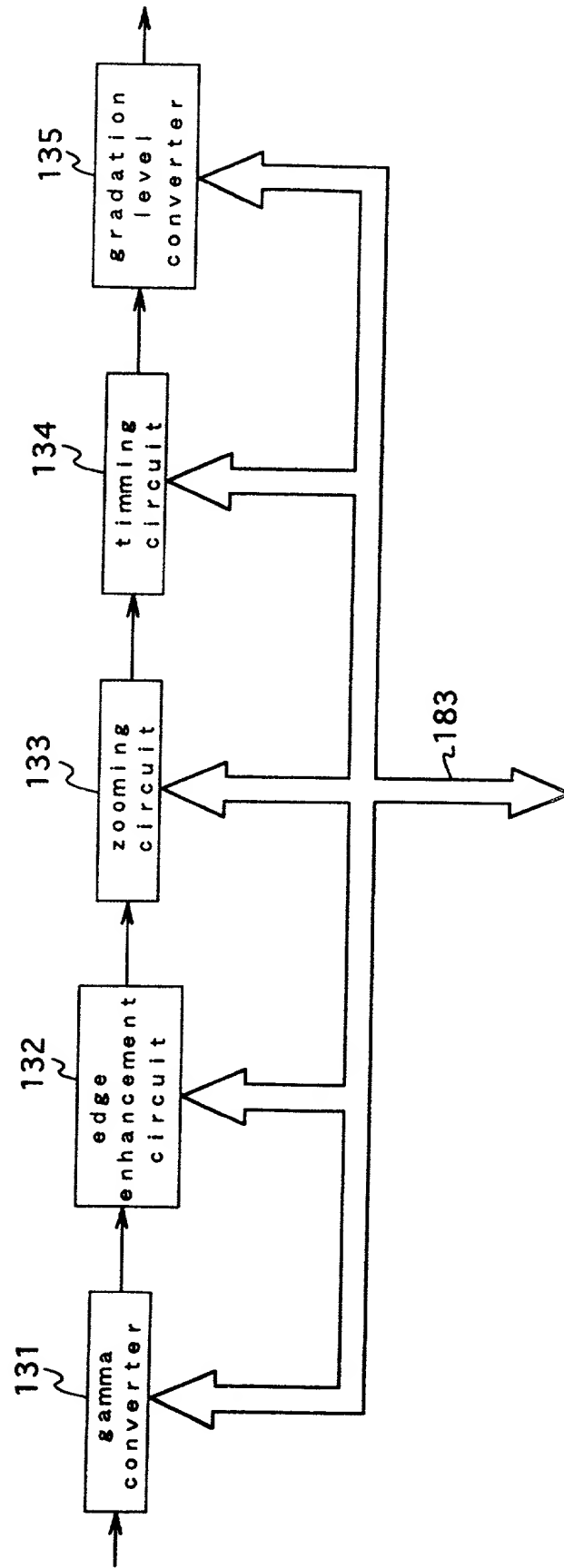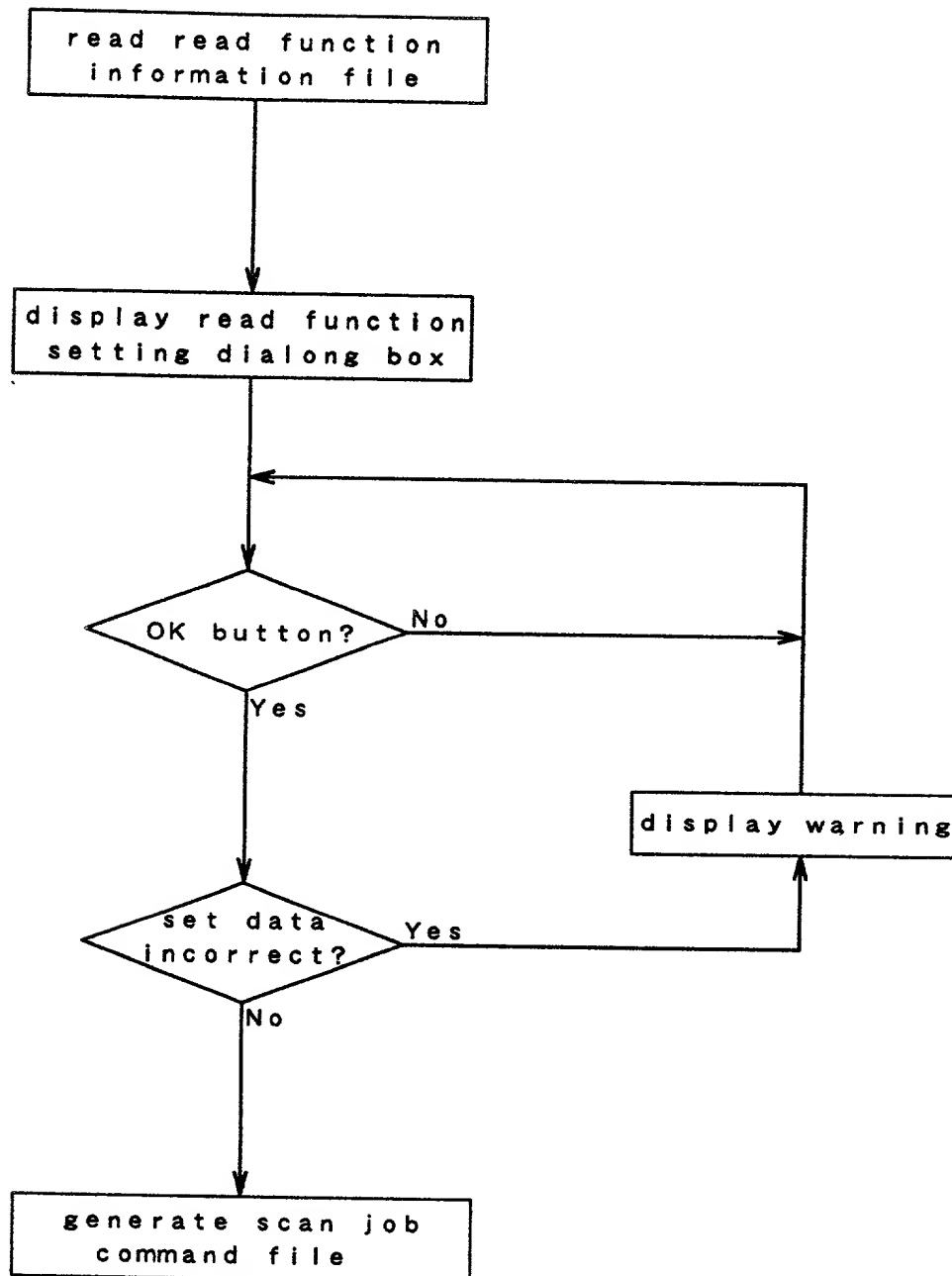
F I G.   19

```
          ┌─────────────────────┐
          │  read read function │
          │  information file   │
          └─────────┬───────────┘
                    │
                    ▼
          ┌─────────────────────┐
          │ display read function│
          │ setting dialong box │
          └─────────┬───────────┘
                    │
        ┌───────────┼──────────────────────────┐
        │           ▼                           │
        │      ◇ OK button? ◇────No─────────────┤
        │           │                           │
        │          Yes                          │
        │           │                 ┌─────────────────┐
        │           │                 │ display warning │
        │           ▼                 └────────▲────────┘
        │      ◇ set data ◇──Yes───────────────┤
        │       incorrect?                      │
        │           │                           │
        │          No                           │
        │           ▼
        │  ┌─────────────────────┐
        │  │  generate scan job  │
        │  │   command file      │
        │  └─────────────────────┘
```
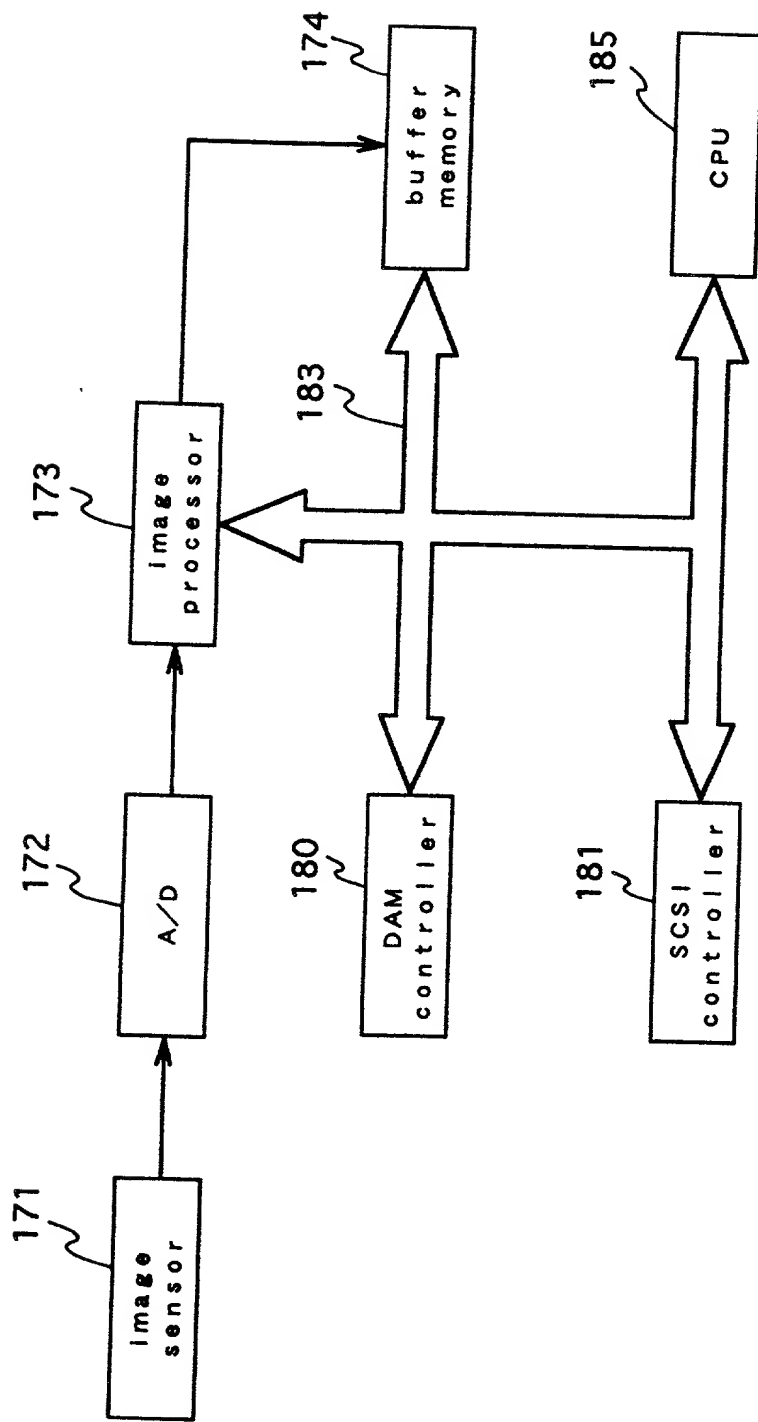
F I G.   20

FIG. 21 (PRIOR ART)

MERCHANT, GOULD, SMITH, EDELL, WELTER & SCHMIDT

United States Patent Application

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; that

I verily believe I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: DIGITAL COPYING MACHINES AND IMAGE READERS WITH OFFLINE INTERFACE

The specification of which
a. ☒ is attached hereto
b. ☐ was filed on   as application serial no.   and was amended on   (if applicable) (in the case of a PCT-filed application) described and claimed in international no.   filed   and as amended on   (if any), which I have reviewed and for which I solicit a United States patent.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, § 1.56 (attached hereto).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119/365 of any foreign application(s) for patent of inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on the basis of which priority is claimed:

a. ☐ no such applications have been filed.
b. ☒ such applications have been filed as follows:

FOREIGN APPLICATION(S), IF ANY, CLAIMING PRIORITY UNDER 35 USC § 119			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)
Japan	7-247638	26/09/95	
Japan	8-005284	17/01/96	
ALL FOREIGN APPLICATION(S), IF ANY, FILED BEFORE THE PRIORITY APPLICATION(S)			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)

I hereby claim the benefit under Title 35, United States Code, § 120/365 of any United States and PCT international application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. APPLICATION NUMBER	DATE OF FILING (day, month, year)	STATUS (patented, pending, abandoned)

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below:

U.S. PROVISIONAL APPLICATION NUMBER	DATE OF FILING (Day, Month, Year)

I hereby appoint the following attorney(s) and/or patent agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith:

Adriano, Sarah B.	Reg. No. 34,470	Kettelberger, Denise	Reg. No. 33,924
Batzli, Brian H.	Reg. No. 32,960	Kowalchyk, Alan W.	Reg. No. 31,535
Beard, John L.	Reg. No. 27,612	Kowalchyk, Katherine M.	Reg. No. 36,848
Beck, Robert C.	Reg. No. 28,184	Krull, Mark A.	Reg. No. 34,205
Bejin, Thomas E.	Reg. No. 37,089	Lacy, Paul A.	Reg. No. 38,946
Berman, Charles	Reg. No. 29,249	Lasky, Michael B.	Reg. No. 29,555
Bogucki, Raymond A.	Reg. No. 17,426	Lynch, David W.	Reg. No. 36,204
Bruess, Steven C.	Reg. No. 34,130	Mau, Michael L.	Reg. No. 30,087
Byrne, Linda M.	Reg. No. 32,404	McDaniel, Karen D.	Reg. No. 37,674
Canady, Karen S.	Reg. No. 39,927	McDonald, Daniel W.	Reg. No. 32,044
Carlson, Alan G.	Reg. No. 25,959	McDonald, Wendy M.	Reg. No. 32,427
Carter, Charles G.	Reg. No. 35,093	McIntyre, Iain A.	Reg. No. 40,377
Caspers, Philip P.	Reg. No. 33,227	Miller, William D.	Reg. No. 37,988
Chiapetta, James R.	Reg. No. 39,634	Mueller, Douglas P.	Reg. No. 30,300
Clifford, John A.	Reg. No. 30,247	Nasiedlak, Tyler L.	Reg. No. 40,099
Conrad, Timothy R.	Reg. No. 30,164	Nelson, Albin J.	Reg. No. 28,650
Cooper, Victor G.	Reg. No. 39,641	Pauly, Daniel M.	Reg. No. 40,123
Crawford, Robert	Reg. No. 32,122	Plunkett, Theodore	Reg. No. 37,209
Daignault, Ronald A.	Reg. No. 25,968	Pollinger, Steven J.	Reg. No. 35,326
Daley, Dennis R.	Reg. No. 34,994	Reich, John C.	Reg. No. 37,703
Daulton, Julie R.	Reg. No. 36,414	Reiland, Earl D.	Reg. No. 25,767
Davidson, Ben M.	Reg. No. 38,424	Schmaltz, David G.	Reg. No. 39,828
Dempster, Shawn B.	Reg. No. 34,321	Schmidt, Cecil C.	Reg. No. 20,566
DiPietro, Mark J.	Reg. No. 28,707	Schuman, Mark D.	Reg. No. 31,197
Edell, Robert T.	Reg. No. 20,187	Schumann, Michael D.	Reg. No. 30,422
Epp Ryan, Sandra	Reg. No. 39,667	Sebald, Gregory A.	Reg. No. 33,280
Farber, Michael B.	Reg. No. 32,612	Sharp, Janice A.	Reg. No. 34,051
Fauver, Cole M.	Reg. No. 36,797	Skoog, Mark T.	Reg. No. 40,178
Funk, Steven R.	Reg. No. 37,830	Smith, Jerome R.	Reg. No. 35,684
Gabilan, Mary Susan	Reg. No. 38,729	Sorensen, Andrew D.	Reg. No. 33,606
Gates, George H.	Reg. No. 33,500	Stinebruner, Scott A.	Reg. No. 38,323
Golla, Charles E.	Reg. No. 26,896	Strodthoff, Kristine M.	Reg. No. 34,259
Gorman, Alan G.	Reg. No. 38,472	Sumner, John P.	Reg. No. 29,114
Gould, John D.	Reg. No. 18,223	Sumners, John S.	Reg. No. 24,216
Gresens, John J.	Reg. No. 33,112	Tellekson, David K.	Reg. No. 32,314
Hamre, Curtis B.	Reg. No. 29,165	Underhill, Albert L.	Reg. No. 27,403
Hassing, Thomas A.	Reg. No. 36,159	Vandenburgh, J. Derek	Reg. No. 32,179
Hillson, Randall A.	Reg. No. 31,838	Welter, Paul A.	Reg. No. 20,890
Hollingsworth, Mark A.	Reg. No. 38,491	Williams, Douglas J.	Reg. No. 27,054
Johnston, Scott W.	Reg. No. 39,721	Wood, Gregory B.	Reg. No. 28,133
Kastelic, Joseph M.	Reg. No. 37,160	Xu, Min S.	Reg. No. 39,536

I hereby authorize them to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/organization who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct Merchant, Gould, Smith, Edell, Welter & Schmidt to the contrary.

Please direct all correspondence in this case to Merchant, Gould, Smith, Edell, Welter & Schmidt at the address indicated below:

Merchant, Gould, Smith, Edell,
Welter & Schmidt
3100 Norwest Center
90 South Seventh Street
Minneapolis, MN 55402-4131

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

2 0 1	Full Name Of Inventor	Family Name MURATA	First Given Name KAZUYUKI	Second Given Name
	Residence & Citizenship	City KYOTO	State or Foreign Country JAPAN	Country of Citizenship JAPAN
	Post Office Address	Post Office Address 2-15-10, KASUMIZAKA, TANABE-CHO, TSUZUKI-GUN	City KYOTO 610-03	State & Zip Code/Country JAPAN

Signature of Inventor 201: *Kazuyuki Murata* Date: *September 9. 1996*

2 0 2	Full Name Of Inventor	Family Name	First Given Name	Second Given Name
	Residence & Citizenship	City	State or Foreign Country	Country of Citizenship
	Post Office Address	Post Office Address	City	State & Zip Code/Country

Signature of Inventor 202: Date:

2 0 3	Full Name Of Inventor	Family Name	First Given Name	Second Given Name
	Residence & Citizenship	City	State or Foreign Country	Country of Citizenship
	Post Office Address	Post Office Address	City	State & Zip Code/Country

Signature of Inventor 203: Date:

2 0 4	Full Name Of Inventor	Family Name	First Given Name	Second Given Name
	Residence & Citizenship	City	State or Foreign Country	Country of Citizenship
	Post Office Address	Post Office Address	City	State & Zip Code/Country

Signature of Inventor 204: Date:

2 0 5	Full Name Of Inventor	Family Name	First Given Name	Second Given Name
	Residence & Citizenship	City	State or Foreign Country	Country of Citizenship
	Post Office Address	Post Office Address	City	State & Zip Code/Country

Signature of Inventor 205: Date:

§ 1.56 Duty to disclose information material to patentability.

(a)   A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is canceled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is canceled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§ 1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

(1)   prior art cited in search reports of a foreign patent office in a counterpart application, and

(2)   the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b)   Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

(1)   It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim;

(2)   It refutes, or is inconsistent with, a position the applicant takes in:

(i)   Opposing an argument of unpatentability relied on by the Office, or

(ii)   Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c)   Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

(1)   Each inventor named in the application:

(2)   Each attorney or agent who prepares or prosecutes the application; and

(3)   Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d)   Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	MURATA	Examiner:	Unknown
Serial No.:	Unknown	Group Art Unit:	Unknown
Filed:	July 25, 2000	Docket No.:	10873.108USD3
Title:	DIGITAL COPIER WITH IMAGE SCANNER APPARATUS AND OFFLINE IMAGE DATA AND CONTROL DATA INTERFACE		

CERTIFICATE UNDER 37 CFR 1.10
'Express Mail' mailing label number: EL544510258US
Date of Deposit: July 25, 2000
I hereby certify that this correspondence is being deposited with the United States Postal Service 'Express Mail
Post Office To Addressee' service under 37 CFR 1.10 on the date indicated above and is addressed to the
Assistant Commissioner for Patents, Washington, D.C . 20231.

By: _Linda McCormick_
Name: Linda McCormick

ATTORNEY CHANGE OF ADDRESS IN APPLICATION

The Commissioner of Patents
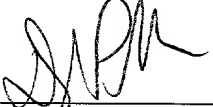 and Trademarks
Washington, D.C. 20231

Dear Sir:

Please send all correspondence for this application to:

MERCHANT & GOULD P.C.
P.O. Box 2903
Minneapolis, MN 55402-0903

Please direct all telephone calls to (612) 332.5300.

Respectfully submitted,

Dated: July 25, 2000

Douglas P. Mueller
Reg. No. 30,300
MERCHANT & GOULD P.C.
P.O. Box 2903
Minneapolis, Minnesota 55402-0903
Telephone: (612) 332-5300

DPM/tvm